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ATMOSPHERIC CLOUD PHYSICS LABORATORY (ACPL) SIMULATION SYST

USER'S GUIDE

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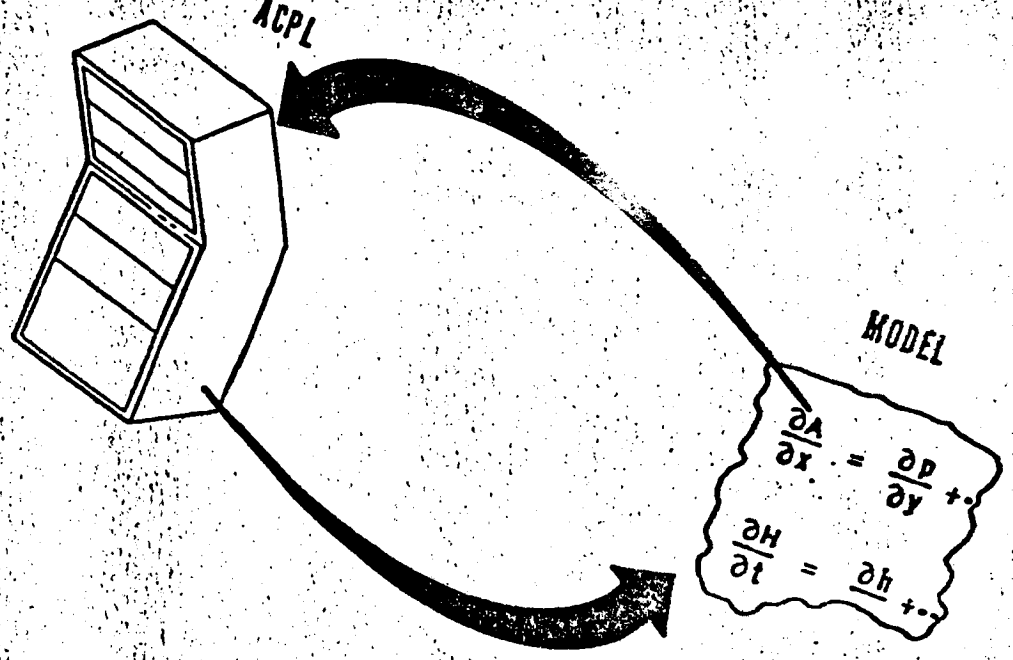

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DOCUMENT CHANGE LOG

USER'S GUIDE

ACPL SIMULATION SYSTEM

As of June 27, 1980

Page 1 of 1

Date of Change	Pages Affected/Change Description
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27 Jun 80 WSB	All - Revision A incorporates Phase ii Analytical Simulation

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SECTION I - INTRODUCTION

This document provides the description and operation instruction for the Atmospheric Cloud Physics Laboratory (ACPL) Simulation System, designed for execution on general purpose large scale computer systems such as the IBM 360/75 or the UNIV 1108 at MSFC. The ACPL Simulation System is capable of simulating the following cloud physics experiments:

- Adiabatic Expansion
- Non-adiabatic Expansion
- Static Diffusion Liquid (SDL)
- Continuous Flow Diffusion (CFD)
- SDL and CFD with Phoretic and Gravitational Motion of Aerosols and Droplets
- Two-Dimensional SDL
- CFD Fluid Dynamics

To present the capabilities of the ACPL Simulation System, it is necessary to describe the major modules which comprise the total system.

The ACPL Simulation System presently consists of two classes of major components. The first class consists of an executive module which performs the data management including the control of logic flow of experiment simulation. A second class includes the system of experimental modules, which can be executed in any order, as specified by the user through input options. These experimental modules are primarily responsible for any computations performed during the ACPL Simulation. Each of the experimental modules, designed to simulate a specified experiment, requires the support of several lower level sub-modules or sub-programs.

Operation of the ACPL Simulation System can be through the submittal of a batch job at a general computer facility. However, to facilitate the operation, the ACPL Simulation System with the interactive graphic capability has been designed and implemented with the usage of the PRIME 400 and the Tektronix Cathode Ray Tube (CRT) terminals at the Data Systems Laboratory of MSFC. The interactive operation allows the user to manually select the modules for execution, and to define the numerical values of parameters required for the calculation.

Section 2 presents the detailed descriptions of the total ACPL Simulation System. Included in the discussion are the capabilities of simulating each experiment. Section 3 of this document describes the organization of the input stream required for the batch mode operation. Section 4 discusses features and capabilities of the interactive mode of the system as designed to be operated at the PRIME 400 computer facility of the Data Systems Lab at MSFC. Section 5 discusses the Job Control Language (JCL) for the ACPL simulation run as would be required for the IBM S/360 computer facilities. Section 6 presents special considerations for the ACPL Simulation operation. Appendix A provides descriptions of Labelled Commons which are commonly used by all major modules; whereas, Labelled Commons required specifically by each of the different modules are described in Appendix B.

SECTION 2 - SYSTEM DESCRIPTION

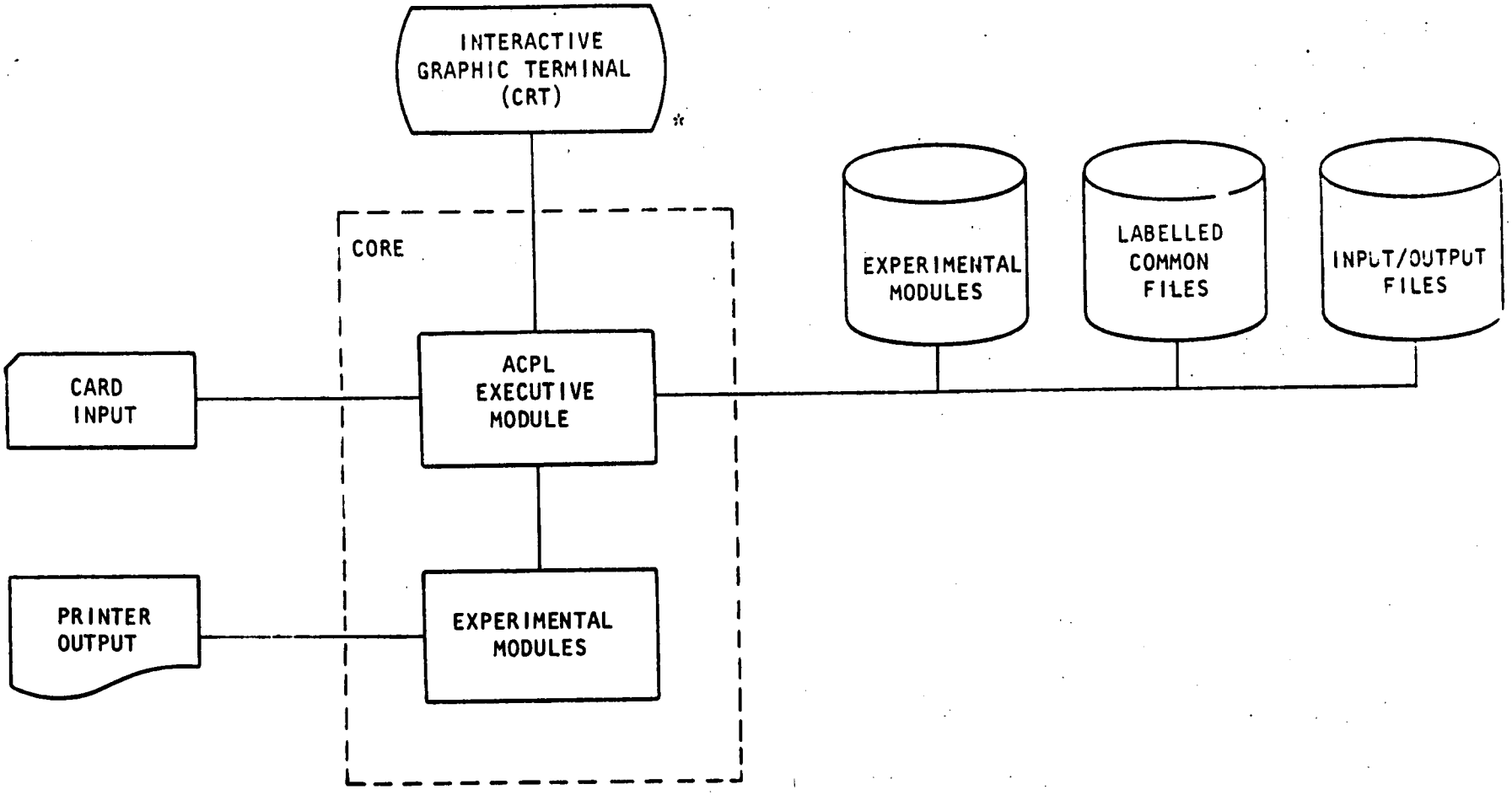
This section presents the discussion of components, organization, and various interface requirements. Included in the discussion will be the modes of operation of the system and means of input/output. Brief discussion of the two user modes of operation--batch and interactive graphic--is given.

2.1 SYSTEM CONTROL STRUCTURE

The control structure of the ACPL Simulator System is comprised of the ACPL Executive Module, Experimental Modules, card input, special disk files, printer output, and a graphics display (CRT) device. This control structure is illustrated in Figure 2-1.

The present ACPL Simulator System is designed to be operational in either batch or interactive graphic mode. For the interactive graphic capability, the ACPL Simulator System utilizes the graphic display software designated Plot 10 Package. This software package is generally available at different computer centers. The Plot 10 software package is easy to interface with and provides to the ACPL Simulator users the print and plot capabilities with a relatively small amount of core memory. The display series can include a list of selectable experimental modules, after which execution is passed to the selected module; the display of input parameters required for operating the selected module; and, the prints and plots of the computed parameters. The detailed descriptions of the prints and plots generated through the interactive graphic capabilities (using Plot 10) are presented in Section 4.

At present, there are three main disk files being used by the ACPL Simulator System. These three files contain load modules of all experimental modules, labelled commons assigned for each of the experiments, and numerical values of input/output parameters. These disk files are a major source of the ACPL Simulator System data management structure.



*Limited to the operation of the PRIME 400 System

Figure 2-1. Control Structure of the ACPL Simulation System

2.2 EXECUTIVE AND UTILITY MODULES OF THE ACPL SIMULATION SYSTEM

The ACPL Executive Module has the control of the overall program logic flow and schedules the operation of the designated Experiment Modules. The Executive Module interprets the user control information which is defined through input cards or an interactive graphics terminal. With the modes of operation defined, the Executive provides the user with either the batch or interactive graphic capability through the usage of the PRIME 400 Computer System. It allows the user to operate and execute the ACPL Simulator through card input only or through an interative graphic device. The Executive Module also passes control to the user designated Experimental Modules which perform the simulation of designated experiments. Thus, it serves as the operational controller of the experimental simulation. The user has the option of selecting or designing the order of processing the simulated experiments. The structural hierachy of the Executive Module and the Experimental Modules is illustrated in Figure 2-2. The modules at the bottom of the figure are in fact experiment dependent in that they contain codings which are directly related to the particular thermodynamic and microphysic processes taking place within each of the chambers.

The Utility Module of the ACPL Simulator System consists of programs and sub-programs designed for supporting the calculation or simulation performed by the Experimental Modules. Programs and sub-programs contained in this module are those designed to compute such parameters as saturation vapor pressure of water, laten heat of condensation, diffusion coefficient for water vapor in the air, thermal conductivity of air, and etc.

2.3 EXPERIMENTAL MODULES

Thr present ACPL Simulator System provides the users with options of selecting a computer simulation of any one of the seven experiments. Each experiment has a corresponding program module designed for simulating the thermodynamic and microphysical processes occurring during the cloud formation experiments. The experimental modules consist of the following:

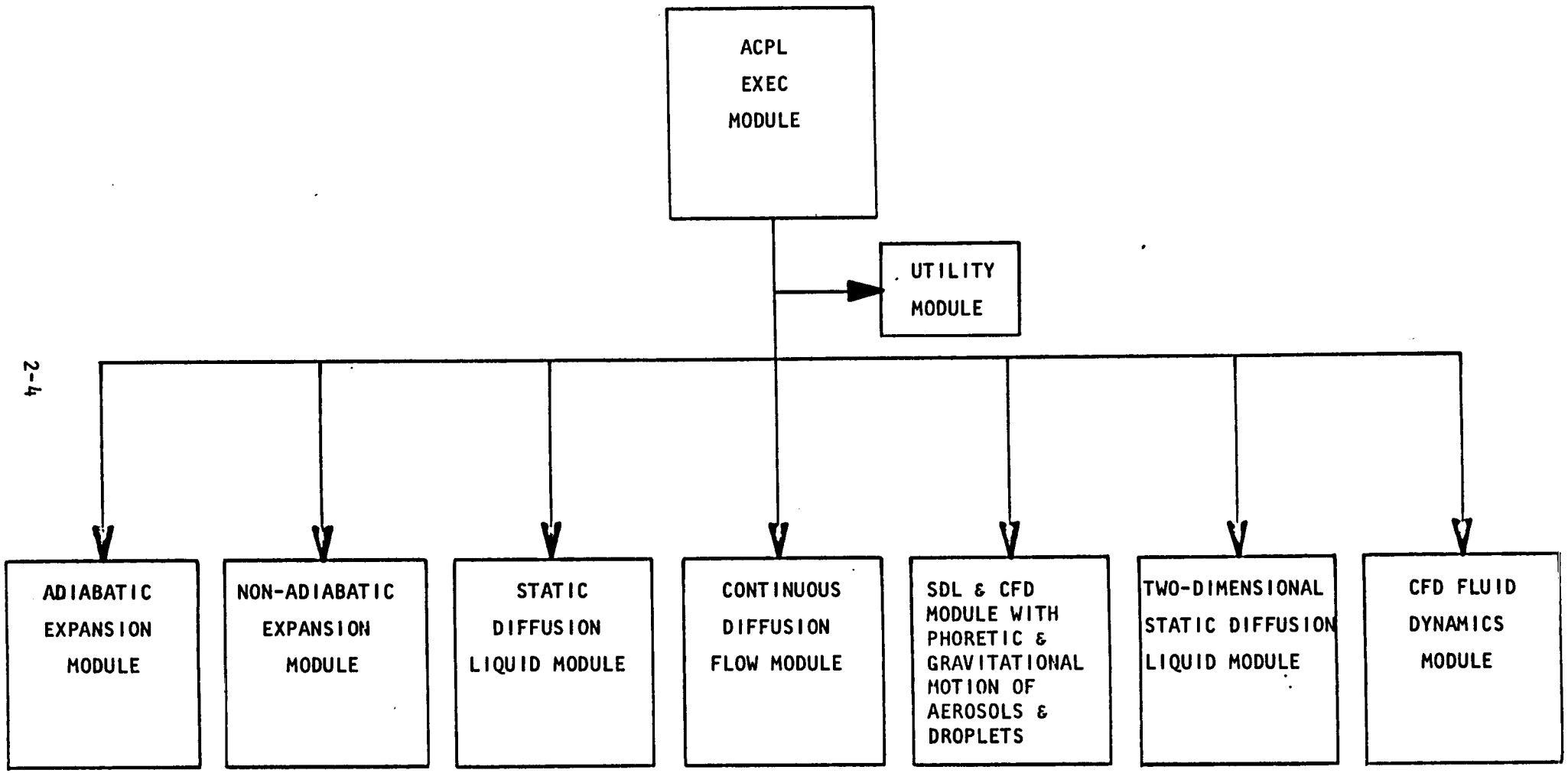


Figure 2-2. Baseline Structure of the ACPL Simulation System

- o The Adiabatic Expansion (AE) Module,
- o The Non-adiabatic Expansion (NE) Module,
- o The Static Diffusion Liquid (SDL) Module,
- o The Continuous Flow Diffusion (CFD) Module,
- o The SDL and CFD Module with Phoretic and Gravitational Motion of Aerosols and Droplets,
- o Two-Dimensional SDL Module, and
- o CFD Fluid Dynamics Module.

The Adiabatic Expansion (AE) Module: The Adiabatic Expansion Module is designed to simulate the cloud-forming experiments. Each requires a model of droplet nucleation and growth in an adiabatically expanding parcel of moist air. The expansion chamber wall temperature is assumed to be uniform (no spatial variations at any time) and to follow the gas temperature exactly during expansion. There are no existing spatial gradients in any property in the interior of the chamber. Thus, the module considers only the evolution in time of the cloud physics processes in a single, adiabatically expanding cloud parcel. The forcing functions of the module include:

- o Pressure Drop Rate vs. Time,
- o Temperature Drop Rate vs. Time,
- o Pressure vs. Time,
- o Updraft vs. Time, or
- o Other User's Specified Function.

The Non-adiabatic Expansion (NE) Module: The model for this module is an extension of the above model designed with the capability of simulating the propagation of a thermal wave through an existing cloud. The physical processes involve the uncoupling of the chamber pressure and/or wall temperature. The chamber pressure and wall temperature are varied independently (i.e., non-adiabatically), creating gradients in the temperature and in the water vapor and cloud liquid water concentrations. Temperature and water vapor concentration gradients interactions are included and coupled with the droplet growth/evaporation process. Thus, the module performs the calculation of heat conduction and vapor diffusion and their interaction with the droplet growth equations.

The Static Diffusion Liquid (SDL) Module: The basic operation concept of the SDL Module is analogous to that of the NE Module. The formulations implemented for both of the SDL and the NE modules are very similar, differing only in the chamber geometry and in the boundary conditions at the chamber walls. However, in the SDL experiment heat conduction and vapor diffusion are everywhere directed along the normal to the plate surfaces, and a single dimension space coordinate is used for describing all processes. The temperature of the plates and the pressure within the chamber are modeled as functions of time. In brief, a time-dependent model of heat and vapor transport, droplet nucleation and growth, and particle drift (thermophoretic and diffusiophoretic motions) in one space dimension are the basic processes considered in the operation of the module.

The Continuous Flow Diffusion (CFD) Module: The basic difference between the operation of the CFD and the SDL experiments lies in the fact that a constant gas flow is maintained parallel to the chamber plates, and aerosol sample is injected into this flow along the median plane of the chamber. In addition, the temperatures of the plates are kept constant during an experiment segment, so that a steady-state condition is maintained. The detailed model of the CFD can be structured as the two-dimension flow of fluid coupled with the diffusion and heat conduction processes. In fact, the differential equations used for describing the physical processes within the CFD chamber are the elliptic types, while those used for the model of the SDL chamber are parabolic.

SDL and CFD Modules with Phoretic and Gravitational Motion of Aerosols and Droplets: These two modules were the result of modifications of the SDL and CFD modules to allow aerosol particles and cloud croplets to move across the chambers in response to phoretic focus created by gradients in gas temperature and composition and, optionally, in response to gravitational forces. These modules were developed in response to the needs of the planned experiments on SDL-CFD comparisons in both zero-g and one-g environments, and on phoretic motion of aerosols in the CFD.

Two-Dimensional SDL Module: Previously maintained SDL models used only a single space dimension, the coordinate normal to the chamber plates (here labelled the Z-coordinate). In other words, these models assumed that gradients

in the values of all variables in the coordinate parallel to the chamber plates were negligible. For studies of droplet formation on a uniformly distributed aerosol, in regions away from the edges of the chamber plates, this assumption introduces little error. However, experiments have now been proposed which depend essentially on the effects of gradients in the radial coordinate. These experiments are of two basic types. In the first type, a single ice particle will be grown near the center of the chamber. In the second, a "thermal probe", whose temperature can be varied independently of the chamber plate temperatures, will be inserted into the center of the chamber.

The model describes a cylindrical section of the SDL chamber, bounded on its upper and lower surfaces by the chamber plates, and centered on the axis of symmetry of the chamber. It is an axisymmetric model; angular variations are neglected. The coordinate normal to the chamber plates is again the Z-coordinate. The primary difference between this model and previous SDL models is the numerical approach to solution of the heat conduction and vapor diffusion equations in these coordinates. Droplet nucleation and growth are treated exactly as in earlier models. The model provides for insertion of a cylindrical thermal probe concentric with the axis of symmetry. A model of ice particle growth has not yet been incorporated in the program.

CFD Fluid Dynamics Module: This module is for modeling three-dimensional fluid dynamics of a rectangular continuous flow diffusion chamber with one axially mounted rectangular exit port.

2.3.1 Input/Output Conventions

Since the ACPL Simulation System is designed to be operational in either the batch mode or the interactive graphic mode, there are two forms of input and output associated with the system.

For the batch mode of operation, at present only input card deck in the standard form is required. The output of each simulation for this mode is listed in the hard copy format. The input card deck contains the numerical values of thermodynamic and geometric constants. The format and contents of the input card deck are presented in Section 3. To facilitate the operation of the system, the input and output of the batch mode run will be stored in a designated file. There is no special input file required for the simulation run.

For the interactive graphic mode, the means of communication between the user and the ACPL Simulation System for input and output is accomplished through the Tektronix Display keyboard and CRT. Detailed description of the input and output requirements of the interactive graphic mode is discussed in Section 4.

2.4 MODES OF OPERATION

This section describes briefly the two modes of operation in which the ACPL Simulator System can be executed.

2.4.1 Batch Mode

The ACPL Simulator System can be executed through card input. In this mode of operation, no interactive graphic device is required. The user is limited only to the option of defining input parameters through card deck.

When the ACPL Simulation is run in batch mode, using either a complete card deck of the executive program and all sub-programs or the executive program and a user library file containing the sub-routines needed, input data may be entered through cards or a direct-access data file.

The execution of the ACPL Simulation in batch mode requires three sections:

1. Control Cards - The control card section of the run consists of all necessary statements to compile, link edit, and execute the program. Examples of control cards for the IBM S/360 Computer System are shown in Section 5.

2. ACPL Simulation Program - The ACPL Simulation Program consists of a card deck of sub-routines plus a driver program to initiate execution of the simulation. The program may be run using the entire card deck for each execution or the sub-routines may be stored in load module form on a direct-access device. In the latter case, only the driver program deck must be submitted for each execution of the simulation. Examples of deck setup for each method are given in Section 5. An example of creating load modules and storing on a direct-access device is also shown in the same section.

3. Input Data - The input data consist of initial values of parameters used by the ACPL Program. A complete description of the input data is presented in Section 3.2.

2.4.2 Interactive Graphic Mode

When the option of interactive graphic mode is selected (limited to only the PRIME 400 Computer System equipped with Tektronix CRT display terminal), the user can manually select from displays the various experimental and utility

modules for the desired simulation. The EXEC Module then assumes control and generates a specific load module for the specified experiment. The selected experimental module then presents a list of constants with numerical values used in the calculations, and input variables required for the simulation. Each of these input variables has a default value on the display; however, any or all of these values can be modified manually by the user through the keyboard input. Once the numerical values of these dynamic input data are defined (either the default or the modified ones), the simulation of the specified experiment can be initiated. The computation of the simulated experiment is completed with the display of a message requesting for an action to be taken by the user. The user has the option to display the output in either graphical format or hard copy listing of computed values of output parameters. The option of selecting any of the output displays is also provided to the user. This process continues until the user is satisfied with the run, and may elect to change the existing data and rerun the same simulation. On the other hand, the control may be returned back to the EXEC Module and the simulation of any other experiment can be performed in the same sequence. For a more detailed description of the interactive graphic mode operation, see Section 4.0.

SECTION 3 - SYSTEM INPUT DESCRIPTION FOR BATCH MODE

The input parameters required for operating the ACPL Simulation System are defined in a standard format of a card deck. Each experiment has its own set of variables defined. This section describes the detailed format of input card decks used for simulating the proposed experiments.

3.1 EXECUTIVE INPUT STREAM

The present input parameter required by the Executive Module is the alpha-numeric name indicating the experiment to be simulated.

3.2 INPUT STREAM FOR VARIOUS EXPERIMENTAL MODULES

3.2.1 Adiabatic Expansion Module

The Adiabatic Expansion Module describes the cloud physics processes taking place in the expansion chamber when the chamber wall temperature is programmed to follow the gas temperature. The model considers an isolated parcel of gas (no transfer of mass or heat energy between the parcel and its environment) initially containing air, water vapor, and condensation nuclei, and which is subjected to changes in pressure. It computes the changes in temperature, pressure, volume, supersaturation, and haze particle/droplet size.

Since every volume element in the chamber experiences the same sequence of events, the initial volume of the gas parcel is arbitrary and can be chosen in the model to provide a convenient set of units for particle concentration. The model uses cgs units throughout, so the most convenient value for the initial volume is one cubic centimeter. All output concentration values are given per cubic centimeter; however, if the user wishes to specify initial aerosol concentrations in some other set of units, he should specify the volume unit as part of the initial conditions (e.g., V_o = 1000 if concentrations are the number per liter).

The input conditions required to use the Adiabatic Expansion Module are:

1. The initial chamber pressure (PRESSO) in millibars, temperature (TEMPO) in ^{o}K, and parcel volume (VØLO) in cm^3.

2. The pressure and temperature of the saturator (PSATUR and TSATUR, respectively) which define the initial mixing ratio, in the same units.

3. The clock time at the beginning (TIMEO) and end (TIMEF) of the experiment, the time step for integration of the model equations (DELTAT), and the time increment at which printed or graphical output is desired (TMØUT), in seconds. For most purposes, the initial time can be zero. However, later on, when sequences of experiments using different chambers will be run, the actual time-line values can be used as inputs for mission planning purposes. The integration time step DELTAT is not currently needed, since the model now uses a numerical integration routine that chooses its own time step. DELTAT can thus be left blank on the input card. However, it has been left in the program because a different integration routine may be used in the future.

4. The thermal accommodation coefficient (ALPHA), the condensation coefficient (BETA) and the surface tension of water (SURFT). ALPHA is generally assumed to be unity, but the value of BETA is not at all that well known, the most commonly accepted value being around 0.03 to 0.04. The surface tension of water is about 75 dynes/cm; a sub-routine has been provided in the model to calculate it more accurately as a function of temperature and solute concentration, but has not yet been implemented.

5. The option name for the initial particle distribution (DISTOP).

6. The parameters for the particle distribution.
   a. Gaussian distribution: Number of particle classes (NCLASS), the mean dry particle radius (AZERO) in centimeters, the halfwidth

(ASIGMA) in centimeters, and the density of the aerosol (DENSTY) in grams per cubic centimeter. The number of particles (NPART) for each class.

b. C & K Distribution: Number of particle classes (NCLASS), the total number of aerosol particles (CONCEN), the C and K (CKCNST) with the range between 0.5 and 1.5 inclusive. The critical supersaturation (SIGMAC) for each class.

c. User-defined Distribution: The number of particle classes (NCLASS). The distribution of particles (NPART) and the critical supersaturation (SIGMAC) for each class.

d. RLOGN Distribution: to be implemented.

Note that the number of particles (NPART) is given per unit of volume (VOLØ) as specified in (1) above, and the critical supersaturation (SIGMAC) for this class, given in absolute value, not percent. (That is, SIGMAC = S_c is the critical supersaturation ratio.)

7. The driving function for the experiment, e.g., the expansion rate vs. time. Number of points to be entered for each option of function is presently limited to 20. Several options are provided here. Reference Table 3-1.

   a. Pressure vs. time: values of pressure at a discrete set of times, with pressure assumed to vary linearly with time between these points.

   b. Expansion rate vs. time: values of (constant) dP/dt for successive time intervals.

   c. Temperature vs. time: values of temperature at discrete points in time, with linear variation from point to point.

   d. Updraft vs. time: values of (constant) dz/dt for successive time intervals.

   e. User function for the expansion rate: a sub-routine is provided wherein the user can program his own curve of dP/dt vs. time.

The input setup for the Adiabatic Expansion Module consists of the parameters shown in Figure 3-1. Distribution parameters are shown in Figure 3-1a. The parameters must be punched into input data cards as delineated in the same figure. See Section 3.3 for procedure to run more than one experiment consecutively.

3.2.1.1 Adiabatic Expansion Experiment Examples

Typical card input setup and format of all parameters are described in Figures 3-1 and 3-1a. Figure 3-2 delineates values of input parameters which are common to all examples (excluding the driving functions and the distribution parameters).

A total of seven examples are shown to illustrate various options. The first five examples provided show ways the driving function options may be used to simulate the Adiabatic Expansion. In these examples, the distribution option is the user-defined function. Two more examples are shown with the dP/dt vs. Time pressure option and the Gaussian and C and K distributions.

Example	Pressure Option	Pressure Option Name	Distribution Option	Distribution Option Name
1	Pressure vs. Time	PVSTIME	User-defined function	USER
2	dP/dt vs. Time	DPDT	User-defined function	USER
3	Temperature vs. Time	TVSTIME	User-defined function	USER
4	Updraft vs. TIME	UPDRFT	User-defined function	USER
5	dP/dt User Function vs. Time	PFUNCT	User-defined function	USER
6	dP/dt vs. Time	DPDT	Gaussian Distribution	GAUSSIAN
7	dP/dt vs. Time	DPDT	C and K Distribution	CANDK

(The pressure options are described in Table 3.1.)

Table 3-1. Driving Functions Which Can Be Specified for Adiabatic Expansion Simulation

ONE PARAMETER CARD MUST BE INPUT FOR EACH POINT (INPUT CARD #7 AND FOLLOWING)		
OPTION	PARAMETERS ENTERED	UNITS
-Pressure vs. Time (PVSTIME)	Pressure Time	millibar seconds
-dP/dt vs. Time (DPDT)	dP/dt Time	millibar/sec. seconds
-Temperature vs. Time (TVSTIME)	Temperature Time	degrees K seconds
-Updraft vs. Time (UPDRFT)	Updraft Time	centimeter/sec. seconds
-Function defined by user (PFUNCT) (See Note)	Data input as required by user's function	

NOTE: The user must submit a double precision function to calculate dP/dt. This function must be included with the FORTRAN source deck. See Example 5.

Card #	Columns	Parameter	Format	Special Considerations
1	1-8	Experiment Option	A8	ADIA EXP
2	1-15	Initial Pressure	F15.5	
2	16-30	Initial Temperature	F15.5	
2	31-45	Initial Volume	F15.5	
3	1-15	Saturator Pressure	F15.5	
3	16-30	Saturator Temperature	F15.5	
4	1-15	Start Time	F15.5	
4	16-30	Finish Time	F15.5	
4	31-45	Time Increment	F15.5	
4	46-60	Output Time Interval	F15.5	
5	1-15	Thermal Accommodation Coefficient	F15.5	
5	16-30	Condensation Coefficient	F15.5	
5	31-45	Surface Tension	F15.5	
6	1-8	Distribution Option Name	A8	Left justified in field. Acceptable parameters are Gaussian, CANDK, RLOGN, USER.
I+6	.	Ith Distribution Parameters	.	Distribution parameters are defined in Figure 3-1a.
.	.	(I = 1, 2, 3 ....M)	.	
.	.		.	
M+6	.	Mth Distribution Parameters		

FIGURE 3-1. FORMAT OF INPUT DATA CARDS FOR ADIABATIC EXPANSION SIMULATION RUN

Card #	Columns	Parameter	Format	Special Considerations
M+7	1-8	Option for the Driving Function	A8	Right justified in the field; acceptable input parameters are PVSTIME, DPDT, TVSTIME, UPDRFT, PFUNCT.
M+7	9-13	Number of Points Used for Specifying the Function - N	I5	
M+j+7	1-15	Numerical Value of Defined Function at the jth Point	F15.5	Function and parameters are defined in Table 3-1.
M+j+7	16-30	Time Corresponding to the Value of the Function at jth Point	F15.5	
.	.		.	
.	.		.	
.	.	(J = 1, 2, 3, ...N)	.	
.	.		.	
M+N+7	16-30	Time Corresponding to the Value of the Function at the Nth Point	F15.5	

(F15.5 is standard FORTRAN format for a real number in which 15 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

FIGURE 3-1. FORMAT OF INPUT DATA CARDS FOR ADIABATIC EXPANSION SIMULATION RUN (Concluded)

Option	Card #	Columns	Parameter	Format	
GAUSSIAN	7	1-5	Number of classes of droplets - M	I5	
	7	6-20	Mean dry particle radius	F15.5	
	7	21-35	Halfwidth	F15.5	
	7	36-50	Density of the aerosol	F15.5	
	I + 7	1-15	Number of particles in the ith class	F15.5	
	⋮	⋮	(I = 1,2,3, ...,M)		
	M + 7	1-15	Number of particles in the Mth class	F15.5	
C AND K	7	1-5	Number of classes of droplets - M	I5	Equation for this distribution is $N_I = CS_I^k$
	7	6-20	Total number of aerosol particles (c)	F15.5	
	7	21-35	Exponent in the C and K Distribution(k)	F15.5	
	I + 7	1-15	Critical supersaturation of the ith class	F15.5	
	⋮	⋮	(i = 1, 2, 3, ... M)		
	M + 7	1-15	Critical supersaturation of the Mth class	F15.5	

FIGURE 3-1a. FORMAT OF INPUT DATA CARDS FOR DISTRIBUTION PARAMETERS FOR ADIABATIC EXPANSION SIMULATION RUN.

Option	Card #	Columns	Parameter	Format
RLOGN	7	1-5	Number of classes of droplets - M	I5
	I + 7	1-15	Mean radius of dry aerosol particle for Ith class	F15.5
	I + 7	16-30	Standard deviation for Ith class	F15.5
	I + 7	31-45	Minimum particle size for Ith class	F15.5
	I + 7	46-60	Maximum particle size for Ith class	F15.5
	.	.		
	.	.	(I = 1, 2, 3, ..., M)	
	M + 7	46-60	Maximum particle size for Mth class	F15.5
USER	7	1-5	Number of Classes of Droplets - M	I5
	7	1-15	Number of particles in the Ith Class	F15.5
	7	16-30	Critical Supersaturation of the Ith Class	F15.5
	.	.		
	.	.	(I = 1, 2, 3, ..., M)	
	7	16-30	Critical Supersaturation of the Mth Class	F15.5

FIGURE 3-1a. FORMAT OF INPUT DATA CARDS FOR DISTRIBUTION PARAMETERS FOR ADIABATIC EXPANSION SIMULATION RUN (Cont'd).

Card 1:

Experiment Option	= ADIA EXP

Card 2:

Initial Pressure	= 1,000.mb.
Initial Temperature	= 293.15^{o}K
Initial Volume	= 1. cm^{3}

Card 3:

Saturator Pressure	= 1,000.mb.
Saturator Temperature	= 293.15^{o}K

Card 4:

Start Time	= 0. seconds
Finish Time	= 100. seconds
Time Increment	= .005 second
Output Time Interval	= 1.0 second

Card 5:

Thermal Accommodation Coefficient	= 1.
Condensation Coefficient	= .03
Surface Tension	= 75. (dynes/cm)

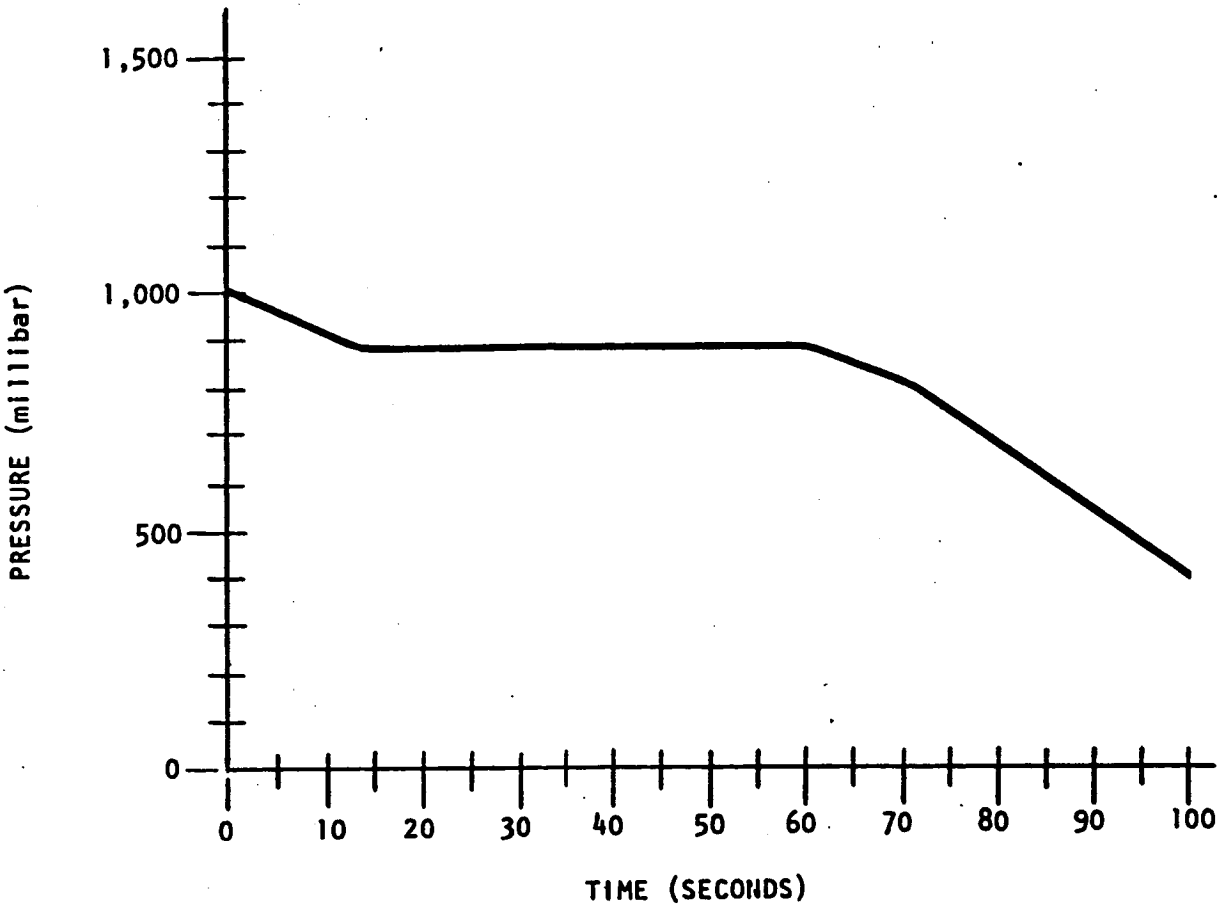
FIGURE 3-2. TYPICAL VALUES OF PARAMETERS WHICH ARE USED IN THE ADIA EXP RUN (EXCLUDING THE DRIVING FUNCTION AND DISTRIBUTION FUNCTION)

The first five examples include a graph of the driving function by a listing of the input data cards. Reference Figures 3-3, 3-4, 3-6, 3-7, 3-9, 3-10, 3-12, 3-13, 3-15, and 3-17. In each of the listings, the first two lines indicate the column numbers of the following input data cards. Example 5 also includes the FORTRAN User Function. Reference Figure 3-16.

In each case of the driving functions, the corresponding sample output of the simulation run using the IBM S/360/75 is provided. Reference Figures 3-5, 3-8, 3-11, 3-14, and 3-18.

Examples 6 and 7 repeat the dP/dt driving function with different distribution functions. Example 6 illustrates the Gaussian distribution function. Reference Figures 3-18a and 3-18b for input and output respectively. Example 7 illustrates the C and K distribution function. Reference Figures 3-18c and 3.18d.

PRESSURE	TIME
1,000.	0.
880.	13.
880	60.
830.	70.
500.	100.



NOTE: Pressure at time t=0 must correspond to initial chamber pressure and end time of the driving function must be greater than or equal to finish time of the simulation.

Figure 3-3. Driving Function of Pressure vs. Time for Example 1 Run

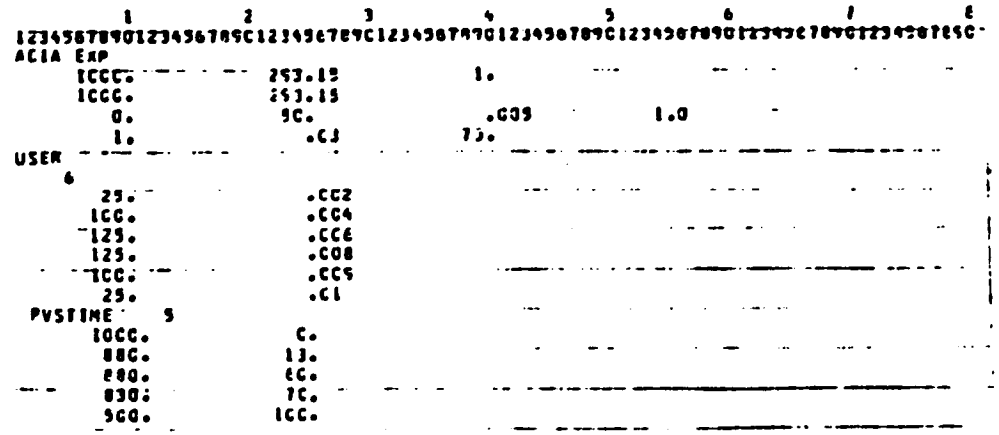


Figure 3-4. Input Card Images for the Case of Pressure vs. Time in Example 1

```
    INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

INITIAL PRESSURE                    0.10000 04 MB
INITIAL TEMPERATURE                 0.29320 03 DEG K
INITIAL VOLUME                      0.10000 01 CC
SATURATOR PRESSURE                  0.10000 04 MB
SATURATOR TEMPERATURE               0.29320 03 DEG K
START TIME                          0.0        SEC
END TIME                            0.50000 02 SEC
INTEGRATION TIME INCREMENT          0.50000-02 SEC
PRINT TIME INCREMENT                0.10000 01 SEC
THERMAL CONDUCTIVITY COEFF.         0.10000 01
CONDENSATION COEFFICIENT            0.30000-01
SURFACE TENSION                     0.75000 02
DISTRIBUTION OPTION:    USER DEFINED FUNCTION
NUMBER OF PARTICLE CLASSES          6
  # PART.     CRITICAL SIGMA TSUPERSATURATION
  0.25000 02                        0.20000-02
  0.10000 03                        0.40000-02
  0.12500 03                        0.60000-02
  0.12500 03                        0.80000-02
  0.10000 03                        0.90000-02
  0.25000 02                        0.10000-01

PRESSURE OPTION:  PRESSURE VS TIME
     PRESSURE (MB)      TIME (SEC)
       0.10000 04       0.0
       0.88000 03       0.13000 02
       0.83000 03       0.30000 02
       0.83000 03       0.40000 02
       0.50000 03       0.50000 02

 CLASS        INIT. RAD.(CM)          CRIT SATUR          CRIT. RAD.(CM)
   1     0.21337631D-04        0.10020000D 01        0.36957861D-04
   2     0.10666816D-04        0.10040000D 01        0.18478931D-04
   3     0.71125437D-05        0.10060000D 01        0.12319287D-04
   4     0.53346078D-05        0.10080000D 01        0.92394693D-05
   5     0.47416958D-05        0.10090000D 01        0.82128581D-05
   6     0.42675262D-05        0.10100000D 01        0.73915722D-05
```

Figure 3-5. Sample Output of the Adiabatic Expansion Simulation for the Case of Pressure vs. Time in Example 1

DROPLET RADII(CM) TIME HISTORY

TIME(SEC)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.11147633E-03	0.99982033E-04	0.93679917E-04	0.88605797E-04	0.86237036E-04	0.83904655E-04
2.00	0.28491667E-03	0.27788640E-03	0.27399091E-03	0.27096202E-03	0.26955875E-03	0.26818365E-03
3.00	0.45151217E-03	0.44631818E-03	0.44354284E-03	0.44134888E-03	0.44033490E-03	0.43934281E-03
4.00	0.58747572E-03	0.58321259E-03	0.58053970E-03	0.57914527E-03	0.57831663E-03	0.57750614E-03
5.00	0.69157709E-03	0.68782549E-03	0.68562734E-03	0.68429061E-03	0.68352302E-03	0.68281149E-03
6.00	0.77095581E-03	0.76751807E-03	0.76568802E-03	0.76424470E-03	0.76357857E-03	0.76292758E-03
7.00	0.83364011E-03	0.83041494E-03	0.82869851E-03	0.82734530E-03	0.82672085E-03	0.82611036E-03
8.00	0.88535715E-03	0.88248868E-03	0.88085607E-03	0.87956898E-03	0.87897526E-03	0.87839481E-03
9.00	0.93045575E-03	0.92751067E-03	0.92594419E-03	0.92470902E-03	0.92413926E-03	0.92358259E-03
10.00	0.97055780E-03	0.96771447E-03	0.96620223E-03	0.96501014E-03	0.96446020E-03	0.96392282E-03
11.00	0.10071693E-02	0.10044128E-02	0.10029469E-02	0.10017913E-02	0.10012584E-02	0.10007375E-02
12.00	0.10411162E-02	0.10384351E-02	0.10370098E-02	0.10358861E-02	0.10353678E-02	0.10348614E-02
13.00	0.10726992E-02	0.10702854E-02	0.10688957E-02	0.10678002E-02	0.10672950E-02	0.10668014E-02
14.00	0.10923449E-02	0.10894896E-02	0.10881205E-02	0.10870416E-02	0.10865438E-02	0.10860574E-02
15.00	0.10975159E-02	0.10945513E-02	0.10939878E-02	0.10925133E-02	0.10920179E-02	0.10915333E-02
16.00	0.11000850E-02	0.10985231E-02	0.10951613E-02	0.10940880E-02	0.10935930E-02	0.10931091E-02
17.00	0.11000421E-02	0.10968607E-02	0.10954991E-02	0.10944260E-02	0.10939310E-02	0.10934472E-02
18.00	0.11000313E-02	0.10965699E-02	0.10956083E-02	0.10945352E-02	0.10940402E-02	0.10935566E-02
19.00	0.11000744E-02	0.10970128E-02	0.10956512E-02	0.10945781E-02	0.10940831E-02	0.10935992E-02
20.00	0.11000681E-02	0.10970265E-02	0.10956647E-02	0.10945916E-02	0.10940963E-02	0.10936128E-02
21.00	0.11000637E-02	0.10970319E-02	0.10956698E-02	0.10945965E-02	0.10941015E-02	0.10936176E-02
22.00	0.11000630E-02	0.10970342E-02	0.10956721E-02	0.10945988E-02	0.10941036E-02	0.10936197E-02
23.00	0.11000572E-02	0.10970349E-02	0.10956728E-02	0.10945995E-02	0.10941043E-02	0.10936204E-02
24.00	0.11000579E-02	0.10970354E-02	0.10956731E-02	0.10945997E-02	0.10941045E-02	0.10936204E-02
25.00	0.11000584E-02	0.10970356E-02	0.10956733E-02	0.10945997E-02	0.10941045E-02	0.10936204E-02
26.00	0.11000588E-02	0.10970358E-02	0.10956733E-02	0.10945995E-02	0.10941043E-02	0.10936204E-02
27.00	0.11000591E-02	0.10970361E-02	0.10956733E-02	0.10945995E-02	0.10941043E-02	0.10936202E-02
28.00	0.11000595E-02	0.10970361E-02	0.10956733E-02	0.10945995E-02	0.10941040E-02	0.10936200E-02
29.00	0.11000598E-02	0.10970363E-02	0.10956733E-02	0.10945995E-02	0.10941040E-02	0.10936200E-02
30.00	0.11000600E-02	0.10970363E-02	0.10956735E-02	0.10945993E-02	0.10941040E-02	0.10936197E-02
31.00	0.11000769E-02	0.11041269E-02	0.11027711E-02	0.11017029E-02	0.11012100E-02	0.11007285E-02
32.00	0.11199181E-02	0.11184916E-02	0.11151487E-02	0.11140904E-02	0.11136022E-02	0.11131251E-02
33.00	0.11331926E-02	0.11306927E-02	0.11263639E-02	0.11283169E-02	0.11278340E-02	0.11273620E-02
34.00	0.11476423E-02	0.11451691E-02	0.11438546E-02	0.11428185E-02	0.11423407E-02	0.11418739E-02
35.00	0.11618566E-02	0.11594088E-02	0.11581078E-02	0.11570826E-02	0.11566097E-02	0.11561478E-02
36.00	0.11757996E-02	0.11733763E-02	0.11720883E-02	0.11710736E-02	0.11706054E-02	0.11701479E-02
37.00	0.11894852E-02	0.11870854E-02	0.11858100E-02	0.11848051E-02	0.11843415E-02	0.11838886E-02
38.00	0.12028860E-02	0.12005090E-02	0.11992457E-02	0.11982503E-02	0.11977912E-02	0.11973425E-02
39.00	0.12160153E-02	0.12136598E-02	0.12124081E-02	0.12114218E-02	0.12109668E-02	0.12105224E-02
40.00	0.12288862E-02	0.12265518E-02	0.12253111E-02	0.12243337E-02	0.12238829E-02	0.12234421E-02
41.00	0.12736050E-02	0.12707391E-02	0.12695349E-02	0.12685864E-02	0.12681487E-02	0.12677212E-02
42.00	0.13404239E-02	0.13382342E-02	0.13371015E-02	0.13361934E-02	0.13357745E-02	0.13353652E-02
43.00	0.14080685E-02	0.14060065E-02	0.14049006E-02	0.14040291E-02	0.14036275E-02	0.14032347E-02
44.00	0.14714985E-02	0.14695417E-02	0.14684258E-02	0.14675860E-02	0.14671988E-02	0.14668202E-02
45.00	0.15302671E-02	0.15283246E-02	0.15272927E-02	0.15264798E-02	0.15261050E-02	0.15257387E-02
46.00	0.15869066E-02	0.15830169E-02	0.15820144E-02	0.15812248E-02	0.15808607E-02	0.15805047E-02
47.00	0.16358993E-02	0.16340602E-02	0.16330832E-02	0.16323137E-02	0.16319589E-02	0.16316122E-02
48.00	0.16835995E-02	0.16818026E-02	0.16808480E-02	0.16800961E-02	0.16797495E-02	0.16794107E-02
49.00	0.17282204E-02	0.17264602E-02	0.17255254E-02	0.17247889E-02	0.17244492E-02	0.17241177E-02
50.00	0.17698612E-02	0.17681936E-02	0.17672198E-02	0.17664931E-02	0.17661997E-02	0.17658399E-02

Figure 3-5. Sample Output of the Adiabatic Expansion Simulation for the Case of Pressure vs. Time in Example 1 (Cont.)

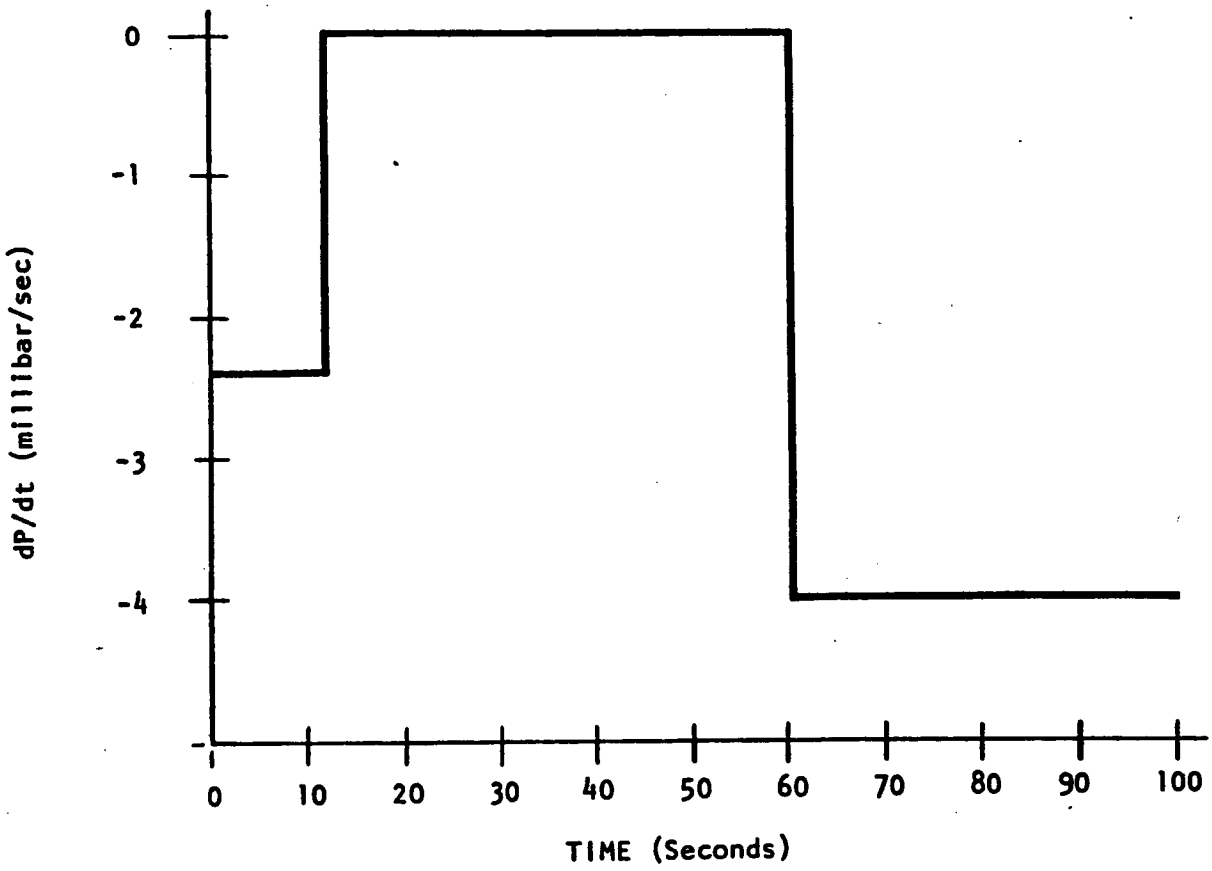
TIME(SEC)	P(MB)	V(CC)	S-1	T(K)
1.00	0.990769044E 03	0.100888436E 01	0.374788777E-01	0.292388136 03
2.00	0.98153833F 03	0.10136623E 01	0.69122791E-01	0.291666046 03
3.00	0.972307626 03	0.10213470E 01	0.97889404E-01	0.291188486 03
4.00	0.96307690E 03	0.10296783E 01	0.79252124E-01	0.290866216 03
5.00	0.953845995 03	0.10383682E 01	0.68671611E-01	0.290613776 03
6.00	0.94461523E 03	0.10472031E 01	0.58388464E-01	0.290354256 03
7.00	0.935384526 03	0.10561113E 01	0.50760660E-01	0.290061326 03
8.00	0.92615381E 03	0.10651597E 01	0.45660812E-01	0.289737306 03
9.00	0.916922856 03	0.10741540E 01	0.42315073E-01	0.289389656 03
10.00	0.907692146 03	0.10834198E 01	0.40056847E-01	0.289026346 03
11.00	0.898461436 03	0.10927939E 01	0.38454250E-01	0.288649176 03
12.00	0.88923071E 03	0.11023293E 01	0.37250601E-01	0.288266436 03
13.00	0.879999786 03	0.11120348E 01	0.36314622E-01	0.287869386 03
14.00	0.87944873E 03	0.11134348E 01	0.11129662E-01	0.288106206 03
15.00	0.879455816 03	0.11136904E 01	0.31639916E-02	0.288190876 03
16.00	0.87945605E 03	0.11137657E 01	0.84959571E-03	0.288214846 03
17.00	0.879456056 03	0.11137819E 01	0.35692472E-03	0.288219976 03
18.00	0.87945605E 03	0.11137867E 01	0.19762301E-03	0.288221686 03
19.00	0.879456056 03	0.11137886E 01	0.13517622E-03	0.288222416 03
20.00	0.87945605E 03	0.11137896E 01	0.11546131E-03	0.288222606 03
21.00	0.879456056 03	0.11137896E 01	0.10789502E-03	0.288222666 03
22.00	0.87945605E 03	0.11137896E 01	0.10472213E-03	0.288222606 03
23.00	0.879456056 03	0.11137896E 01	0.10361084E-03	0.288222666 03
24.00	0.87945605E 03	0.11137896E 01	0.10316425E-03	0.288222606 03
25.00	0.879456056 03	0.11137896E 01	0.10302369E-03	0.288222656 03
26.00	0.87945605E 03	0.11137896E 01	0.10297062E-03	0.288222606 03
27.00	0.879456056 03	0.11137896E 01	0.10294859E-03	0.288222666 03
28.00	0.87945605E 03	0.11137896E 01	0.10294079E-03	0.288222606 03
29.00	0.879456056 03	0.11137896E 01	0.10293804E-03	0.288222666 03
30.00	0.87945605E 03	0.11137896E 01	0.10293702E-03	0.288222606 03
31.00	0.874456056 03	0.11187105E 01	0.12568798E-01	0.287869036 03
32.00	0.86945605E 03	0.11239443E 01	0.16991474E-01	0.287600346 03
33.00	0.864456056 03	0.11293411E 01	0.18161315E-01	0.287363046 03
34.00	0.85945605E 03	0.11348295E 01	0.18341679E-01	0.287134526 03
35.00	0.854456056 03	0.11403894E 01	0.18307362E-01	0.286906256 03
36.00	0.84945605E 03	0.11460056E 01	0.18230174E-01	0.286677006 03
37.00	0.844456056 03	0.11516752E 01	0.18143237E-01	0.286446066 03
38.00	0.83945605E 03	0.11574C49E 01	0.18058669E-01	0.286213986 03
39.00	0.834456056 03	0.11631956E 01	0.17981641E-01	0.285978766 03
40.00	0.82945605E 03	0.11690493E 01	0.17912921E-01	0.285742436 03
41.00	0.796456056 03	0.12067261E 01	0.97056746E-01	0.283383306 03
42.00	0.76345605E 03	0.12493420E 01	0.11893862E 00	0.281511236 03
43.00	0.730456056 03	0.12959C80E 01	0.12918279E 00	0.279687016 03
44.00	0.69745605E 03	0.13464708E 01	0.12833422E 00	0.277783206 03
45.00	0.664456056 03	0.14014311E 01	0.13201833E 00	0.275754396 03
46.00	0.63145605E 03	0.14613743E 01	0.13711601E 00	0.273578806 03
47.00	0.598456056 03	0.15270233E 01	0.14398366E 00	0.271236826 03
48.00	0.56545605E 03	0.15992508E 01	0.15298939E 00	0.268705066 03
49.00	0.532456056 03	0.16791201E 01	0.16467571E 00	0.265936796 03
50.00	0.49945605E 03	0.17680244E 01	0.17993271E 00	0.262956056 03

Figure 3-5. Sample Output of the Adiabatic Expansion Simulation for the Case of Pressure vs. Time in Example 1 (Cont.)

TIME(SEC)	NW(GM.MOLE)	NV(GM.MOLE)	NG(GM.MOLE)	MIXING RATIO
1.00	0.93744373E-10	0.95898395E-06	0.41027743E-04	0.14338593E-05
2.00	0.23734483E-08	0.95670475E-06	0.41023458E-04	0.36333312E-04
3.00	0.10112981E-07	0.94896529E-06	0.41017716E-04	0.15469133E-03
4.00	0.22754410E-07	0.93632389E-06	0.41005085E-04	0.34815888E-03
5.00	0.37457589E-07	0.92162671E-06	0.40990373E-04	0.57315966E-03
6.00	0.52138763E-07	0.90693553E-06	0.40975690E-04	0.79810852E-03
7.00	0.66105542E-07	0.89297276E-06	0.40961735E-04	0.10121346E-02
8.00	0.79395022E-07	0.87968328E-06	0.40948435E-04	0.12158547E-02
9.00	0.92227481E-07	0.86685077E-06	0.40935600E-04	0.14126469E-02
10.00	0.10479425E-06	0.85428405E-06	0.40923042E-04	0.16054676E-02
11.00	0.11721949E-06	0.84185882E-06	0.40910614E-04	0.17961683E-02
12.00	0.12957698E-06	0.82950129E-06	0.40898260E-04	0.19858089E-02
13.00	0.14190437E-06	0.81717394E-06	0.40885934E-04	0.21752347E-02
14.00	0.14969828E-06	0.80938003E-06	0.40878134E-04	0.22938934E-02
15.00	0.15196542E-06	0.80711283E-06	0.40875864E-04	0.23276426E-02
16.00	0.15262191E-06	0.80645634E-06	0.40875209E-04	0.23397568E-02
17.00	0.15276322E-06	0.80631503E-06	0.40875064E-04	0.23425699E-02
18.00	0.15280892E-06	0.80626533E-06	0.40875020E-04	0.23428618E-02
19.00	0.15282669E-06	0.80625142E-06	0.40875006E-04	0.23430300E-02
20.00	0.15283251E-06	0.80624574E-06	0.40875006E-04	0.23431560E-02
21.00	0.15283467E-06	0.80624358E-06	0.40875006E-04	0.23431471E-02
22.00	0.15283558E-06	0.80624267E-06	0.40874991E-04	0.23431615E-02
23.00	0.15283592E-06	0.80624233E-06	0.40874991E-04	0.23431636E-02
24.00	0.15283604E-06	0.80624221E-06	0.40874991E-04	0.23431657E-02
25.00	0.15283609E-06	0.80624216E-06	0.40874991E-04	0.23431666E-02
26.00	0.15283609E-06	0.80624216E-06	0.40874991E-04	0.23431666E-02
27.00	0.15283609E-06	0.80624216E-06	0.40874991E-04	0.23431666E-02
28.00	0.15283609E-06	0.80624216E-06	0.40874991E-04	0.23431666E-02
29.00	0.15283609E-06	0.80624216E-06	0.40874991E-04	0.23431666E-02
30.00	0.15283609E-06	0.80624216E-06	0.40874991E-04	0.23431666E-02
31.00	0.15583026E-06	0.80324799E-06	0.40872008E-04	0.23891283E-02
32.00	0.16114018E-06	0.79793807E-06	0.40866697E-04	0.24717876E-02
33.00	0.16738437E-06	0.79169388E-06	0.40860454E-04	0.25669369E-02
34.00	0.17392091E-06	0.78515734E-06	0.40853920E-04	0.26671719E-02
35.00	0.18053214E-06	0.77854611E-06	0.40847299E-04	0.27689335E-02
36.00	0.18716787E-06	0.77191044E-06	0.40840663E-04	0.28710276E-02
37.00	0.19381781E-06	0.76526644E-06	0.40834013E-04	0.29733351E-02
38.00	0.20048020E-06	0.75859811E-06	0.40827348E-04	0.30758358E-02
39.00	0.20715339E-06	0.75192486E-06	0.40820683E-04	0.31785644E-02
40.00	0.21383721E-06	0.74524110E-06	0.40813989E-04	0.32814971E-02
41.00	0.23782940E-06	0.72124885E-06	0.40790008E-04	0.36503354E-02
42.00	0.27785416E-06	0.68122409E-06	0.40749976E-04	0.42872930E-02
43.00	0.32232293E-06	0.63675532E-06	0.40705505E-04	0.49549975E-02
44.00	0.36805051E-06	0.59102780E-06	0.40659783E-04	0.56813460E-02
45.00	0.41411130E-06	0.54496695E-06	0.40613726E-04	0.63749329E-02
46.00	0.46023706E-06	0.49884119E-06	0.40567596E-04	0.70896137E-02
47.00	0.50626221E-06	0.45281604E-06	0.40521569E-04	0.78039132E-02
48.00	0.55159689E-06	0.40708136E-06	0.40475832E-04	0.85149072E-02
49.00	0.59719417E-06	0.36188408E-06	0.40430634E-04	0.92145231E-02
50.00	0.64151516E-06	0.31758309E-06	0.40386323E-04	0.99101178E-02

Figure 3-5. Sample Output of the Adiabatic Expansion Simulation for the Case of Pressure vs. Time in Example 1 (Cont.)

dP/dt	Time
-2.3	13.
0.0	60.
-.5	70.
-4.0	100.



NOTE: For each point, enter the time at the end of the interval. In addition, end time of the driving function must be greater than or equal to finish time of the simulation.

In this example, dP/dt = -2.3 in the interval 0-13 seconds, so 13 is the time which is entered.

Figure 3-6. Driving function of dP/dt vs. Time in Example 2

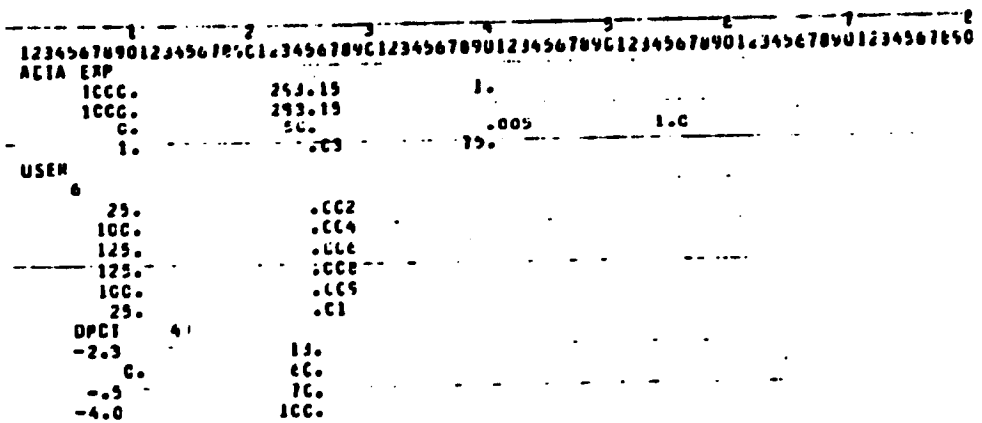


Figure 3-7. Card Images for the Case of dP/dt vs. Time in Example 2

INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

INITIAL PRESSURE	0.10000 04	MB
INITIAL TEMPERATURE	0.2932C 03	DEG K
INITIAL VOLUME	C.10000 01	CC
SATURATOR PRESSURE	C.10000 04	MB
SATURATOR TEMPERATURE	0.29320 03	DEG K
START TIME	0.0	SEC
END TIME	0.50000 02	SEC
INTEGRATION TIME INCREMENT	0.50000-02	SEC
PRINT TIME INCREMENT	C.10000 01	SEC
THERMAL CONDUCTIVITY COEFF.	0.1000D 01	
CONDENSATION COEFFICIENT	0.30000-01	
SURFACE TENSION	0.75000 02	
DISTRIBUTION OPTION:	USER DEFINED FUNCTION	
NUMBER OF PARTICLE CLASSES	6	

# PART.	CRITICAL SIGMA (SUPERSATURATION)
C.25000 02	0.2000D-02
0.10000 03	C.40000-02
0.12500 03	0.6000C-02
0.12500 03	C.80000-02
0.10000 03	C.50000-02
0.25000 02	C.10000-01

PRESSURE OPTION: DP/DT VS TIME

DP/DT (MB)	TIME (SEC)
-0.23000 01	0.13000 02
0.0	0.60000 02
-0.50000 00	0.70000 02
-C.4C000 01	0.10000 03

CLASS	INIT. RAD.(CM)	CRIT SATUR	CRIT. RAD.(CM)
1	0.21337631D-04	0.100200000 01	0.36997861D-04
2	0.10668816D-04	0.10040000D 01	0.18478931D-04
3	0.71125437D-05	0.10060000D 01	0.12319287D-04
4	0.53344078D-05	0.10080000D 01	0.92394653D-05
5	0.47416558D-05	0.10090000D 01	0.82128581D-05
6	0.42675262D-05	0.10100000D 01	0.73915722D-05

Figure 3-8. Sample Output of the Adiabatic Expansion Simulation for the Case of dP/dt vs. Time in Example 2

DROPLET RADIICM) TIME HISTORY

TIME(SEC)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.42231928E-04	0.24088557E-04	0.13972088E-04	0.83808472E-05	0.6838648UE-05	0.578058[illegible]E-05
2.00	0.10538695E-03	0.88056695E-04	0.75638149E-04	0.63677973E-04	0.57517624E-04	0.51040843E-04
3.00	0.16947692E-03	0.17607133E-03	0.16614751E-03	0.15769730E-03	0.1531284[illegible]E-03	0.14835002E-03
4.00	0.27543888E-03	0.26464229E-03	0.25714056E-03	0.25008572E-03	0.24651107E-03	0.24279211E-03
5.00	0.33540625[illegible]E-03	0.34490228E-03	0.33857650E-03	0.33265632E-03	0.3296677[illegible]E-03	0.32656663E-03
6.00	0.42157620E-03	0.41346927E-03	0.40768969E-03	0.40268153E-03	0.40005770E-03	0.39733876E-03
7.00	0.47750382E-03	0.47C16004E-03	0.465C7455E-03	0.46033529F-03	0.45795040E-03	0.45548123E-03
8.00	0.52362494E-03	0.5165C917E-03	0.51176478E-03	0.50734775E-03	0.50512655E-03	0.50282804E-03
9.00	0.56119962E-03	0.5544[illegible]101E-03	0.55C14575E-03	0.54596364E-03	0.54386165E-03	0.54168724E-03
10.00	0.57293397E-03	0.58664777E-03	0.58224204E-03	0.57833805E-03	0.57632639E-03	0.57424558E-03
11.00	0.62022575E-03	0.61416742E-03	0.61001186E-03	0.60614897E-03	0.60420856E-03	0.60220226E-03
12.00	0.64432621E-03	0.63843443E-03	0.63440250E-03	0.63065379E-03	0.62877429E-03	0.62682899E-03
13.00	0.66406537E-03	0.66032587E-03	0.65639541E-03	0.65275165E-03	0.65091997E-03	0.64902660E-03
14.00	0.68052847E-03	0.67751721E-03	0.67132874E-03	0.66774478E-03	0.66594547E-03	0.66408562E-03
15.00	0.68782689E-03	0.68223011E-03	C.67840237E-03	0.67484728E-03	0.67306240E-03	0.67121768E-03
16.00	0.69110887E-03	0.68553141E-03	0.68117718E-03	0.67817490E-03	0.67639654E-03	0.67455834E-03
17.00	0.69269142E-03	0.68712234E-03	0.68331393E-03	0.67977700E-03	0.67800144E-03	0.67616627E-03
18.00	0.69345534E-03	0.68788929E-03	0.68408321E-03	0.68054814E-03	0.67877350E-03	0.67693950E-03
19.00	0.69382414E-03	C.688258S6E-03	0.68445271E-03	0.68091811E-03	0.6791437UE-03	0.67730970E-03
20.00	0.69398084E-03	0.68841432E-03	0.68462801E-03	0.68107271E-03	0.67929807E-03	0.67746383E-03
21.00	0.69406372E-03	0.68845581E-03	0.68468857E-03	0.68115257E-03	0.67937747E-03	0.67754276E-03
22.00	0.69413750E-03	C.68853796E-03	0.68472954E-03	0.68119261E-03	0.67941681E-03	0.67758164E-03
23.00	0.69413241E-03	0.6885E101E-03	0.68475143E-03	0.68121334E-03	0.67943730E-03	0.67760120E-03
24.00	0.69414801E-03	C.68857474E-03	0.68476400F-03	0.68122474E-03	0.67944801E-03	0.67761145E-03
25.00	0.69415732E-03	C.6885E219E-03	C.68477029E-03	0.68122987E-03	0.67945244E-03	0.67761540E-03
26.00	0.69416384E-03	0.68858685E-03	0.68477355E-03	0.68123196E-03	0.67945407E-03	0.67761634E-03
27.00	0.69416699E-03	C.68855011E-03	0.68477541E-03	0.68123266E-03	0.67945430E-03	0.67761587E-03
28.00	0.69417316E-03	C.68859244E-03	0.68477658E-03	0.68123265E-03	0.67945360E-03	0.67761471E-03
29.00	0.69417711E-03	0.68859453E-03	0.68477751E-03	0.68123220E-03	0.67945267E-03	0.67761308E-03
30.00	0.69418107E-03	C.68859640E-03	C.68477797E-03	0.68123173E-03	0.67945127E-03	0.67761121E-03
31.00	0.69418456E-03	0.68859803E-03	0.68477844E-03	0.68123103E-03	0.67945011E-03	0.67760912E-03
32.00	0.69418829E-03	C.68859966E-03	0.68477890E-03	0.68123010E-03	0.67944871E-03	0.67760726E-03
33.00	0.69419178E-03	0.68860152E-03	0.68477937E-03	0.68122940E-03	0.67944732E-03	0.67760516E-03
34.00	0.69419551E-03	0.68860315E-03	0.68477960E-03	0.68122847E-03	0.67944592E-03	0.67760306E-03
35.00	0.69419900E-03	C.68860478E-03	0.68478007E-03	0.68122777E-03	0.67944452E-03	0.67760C97E-03
36.00	0.69420249E-03	0.68860641E-03	0.68478030E-03	0.68122684E-03	0.67944289E-03	0.67759887E-03
37.00	0.69420622E-03	C.68860804E-03	0.68478077E-03	0.68122614E-03	0.67944149E-03	0.67759701E-03
38.00	0.69420971E-03	C.6886C943E-03	0.68478100E-03	0.68122521E-03	0.67944010E-03	0.67759492E-03
39.00	0.69421320E-03	0.68861106E-03	0.68478147E-03	0.68122428E-03	0.67943870E-03	0.67759282E-03
40.00	0.69421669E-03	C.68861269E-03	0.68478170E-03	0.68122358E-03	0.67943707E-03	0.67759072E-03
41.00	0.69422042E-03	C.68861432E-03	0.68478216E-03	0.68122265E-03	0.67943567E-03	0.67758863E-03
42.00	0.69422391E-03	0.68861595E-03	0.68478240E-03	0.68122172E-03	0.67943428E-03	0.67758653E-03
43.00	0.69422740E-03	C.68861758E-03	0.68478286E-03	0.68122102E-03	0.67943288E-03	0.67758444E-03
44.00	0.69423090E-03	0.68861921E-03	0.68478310E-03	0.68122009E-03	0.67943125E-03	0.67758234E-03
45.00	0.69423462E-03	0.68862084E-03	0.68478356E-03	0.68121916E-03	0.67942985E-03	0.67758025E-03
46.00	0.69423812E-03	0.68862247E-03	0.68478379E-03	0.68121846E-03	0.67942846E-03	0.67757815E-03
47.00	0.69424161E-03	C.68862410E-03	C.68478426E-03	0.68121753E-03	0.67942706E-03	0.67757606E-03
48.00	0.69424533E-03	C.68862573E-03	0.68478449E-03	0.68121683E-03	0.67942566E-03	0.67757396E-03
49.00	0.69424883E-03	C.68862736E-03	0.68478496E-03	0.68121590E-03	0.67942403E-03	0.67757186E-03
50.00	0.69425232E-03	0.68862899E-03	0.68478519E-03	0.68121497E-03	0.67942264E-03	0.67756977E-03

Figure 3-8. Sample Output of the Adiabatic Expansion Simulation for the Case of dP/dt vs. Time in Example 2 (Cont.)

TIME(SEC)	P(MB)	V(CC)	S-I	T(K)
1.00	0.99769999E 03	0.10018479E 01	0.92906999E-02	0.29295778E 03
2.00	0.99539990E 03	0.10033073E 01	0.18455818E-01	0.29276709E 03
3.00	0.99309985E 03	0.10050173E 01	0.26364987E-01	0.29259139E 03
4.00	0.99079980E 03	0.10068302E 01	0.31194136E-01	0.29245066E 03
5.00	0.98849976E 03	0.10087643E 01	0.32382589E-01	0.29235010E 03
6.00	0.98619995E 03	0.10107927E 01	0.30758880E-01	0.29228047E 03
7.00	0.98389990E 03	0.10128736E 01	0.27697042E-01	0.29222607E 03
8.00	0.98159985E 03	0.10149727E 01	0.24347264E-01	0.29217480E 03
9.00	0.97929980E 03	0.10170689E 01	0.21393172E-01	0.29211890E 03
10.00	0.97699976E 03	0.10191545E 01	0.19024715E-01	0.29205615E 03
11.00	0.97469995E 03	0.10212326E 01	0.17224297E-01	0.29198706E 03
12.00	0.97239990E 03	0.10233040E 01	0.15887160E-01	0.29191235E 03
13.00	0.97009985E 03	0.10253735E 01	0.14889605E-01	0.29183350E 03
14.00	0.97010913E 03	0.10256062E 01	0.72556548E-02	0.29191895E 03
15.00	0.97010938E 03	0.10257235E 01	0.35542089E-02	0.29196021E 03
16.00	0.97010938E 03	0.10257797E 01	0.17957124E-02	0.29197998E 03
17.00	0.97010938E 03	0.10258064E 01	0.94428193E-03	0.29198950E 03
18.00	0.97010938E 03	0.10258198E 01	0.53307577E-03	0.29199414E 03
19.00	0.97010938E 03	0.10258265E 01	0.33525401E-03	0.29199634E 03
20.00	0.97010938E 03	0.10258284E 01	0.25228318E-03	0.29199731E 03
21.00	0.97010938E 03	0.10258303E 01	0.20918871E-03	0.29199780E 03
22.00	0.97010938E 03	0.10258312E 01	0.18744181E-03	0.29199805E 03
23.00	0.97010938E 03	0.10258312E 01	0.17587689E-03	0.29199805E 03
24.00	0.97010938E 03	0.10258312E 01	0.16934933E-03	0.29199824E 03
25.00	0.97010938E 03	0.10258312E 01	0.16620263E-03	0.29199829E 03
26.00	0.97010938E 03	0.10258312E 01	0.16458551E-03	0.29199829E 03
27.00	0.97010938E 03	0.10258312E 01	0.16371206E-03	0.29199829E 03
28.00	0.97010938E 03	0.10258312E 01	0.16328495E-03	0.29199829E 03
29.00	0.97010938E 03	0.10258312E 01	0.16305519E-03	0.29199829E 03
30.00	0.97010938E 03	0.10258312E 01	0.16292397E-03	0.29199829E 03
31.00	0.97010938E 03	0.10258312E 01	0.16285636E-03	0.29199829E 03
32.00	0.97010938E 03	0.10258312E 01	0.16281937E-03	0.29199829E 03
33.00	0.97010938E 03	0.10258312E 01	0.16280136E-03	0.29199829E 03
34.00	0.97010938E 03	0.10258312E 01	0.16279181E-03	0.29199829E 03
35.00	0.97010938E 03	0.10258312E 01	0.16278641E-03	0.29199829E 03
36.00	0.97010938E 03	0.10258312E 01	0.16278366E-03	0.29199829E 03
37.00	0.97010938E 03	0.10258312E 01	0.16278228E-03	0.29199829E 03
38.00	0.97010938E 03	0.10258312E 01	0.16278155E-03	0.29199829E 03
39.00	0.97010938E 03	0.10258312E 01	0.16278113E-03	0.29199829E 03
40.00	0.97010938E 03	0.10258312E 01	0.16278091E-03	0.29199829E 03
41.00	0.97010938E 03	0.10258312E 01	0.16278079E-03	0.29199829E 03
42.00	0.97010938E 03	0.10258312E 01	0.16278074E-03	0.29199829E 03
43.00	0.97010938E 03	0.10258312E 01	0.16278071E-03	0.29199829E 03
44.00	0.97010938E 03	0.10258312E 01	0.16278069E-03	0.29199829E 03
45.00	0.97010938E 03	0.10258312E 01	0.16278069E-03	0.29199829E 03
46.00	0.97010938E 03	0.10258312E 01	0.16278069E-03	0.29199829E 03
47.00	0.97010938E 03	0.10258312E 01	0.16278069E-03	0.29199829E 03
48.00	0.97010938E 03	0.10258312E 01	0.16278069E-03	0.29199829E 03
49.00	0.97010938E 03	0.10258312E 01	0.16278069E-03	0.29199829E 03
50.00	0.97010938E 03	0.10258312E 01	0.16278071E-03	0.29199829E 03

Figure 3-8. Sample Output of the Adiabatic Expansion Simulation for the Case of dP/dt vs. Time In Example 2 (Cont.)

TIME(SEC)	AWIGH.MOLE)	AVIGP.MOLE)	NGIGH.MOLE)	MIXING RATIO
1.00	0.87289626E-12	0.99907671E-06	0.41027830E-04	0.13351315E-07
2.00	0.48010873E-10	0.99902942E-06	0.41027786E-04	0.73429851E-06
3.00	0.51703775E-09	0.99856103E-06	0.41027321E-04	0.79096508E-05
4.00	0.19318678E-08	0.99714586E-06	0.41025909E-04	0.29554067E-04
5.00	0.44448463E-08	0.99463292E-06	0.41023392E-04	0.67990288E-04
6.00	0.78012725E-08	0.99127700E-06	0.41020030E-04	0.11933778E-03
7.00	0.11590537E-07	0.98748176E-06	0.41016247E-04	0.17724234E-03
8.00	0.15469741E-07	0.98360854E-06	0.41012361E-04	0.23661129E-03
9.00	0.19234221E-07	0.97984409E-06	0.41008607E-04	0.29428047E-03
10.00	0.22826253E-07	0.97625204E-06	0.41005012E-04	0.34924899E-03
11.00	0.26250579E-07	0.97282773E-06	0.41001578E-04	0.40165219E-03
12.00	0.29538391E-07	0.96953991E-06	0.40998289E-04	0.45200554E-03
13.00	0.32726813E-07	0.96635145E-06	0.40995103E-04	0.50082011E-03
14.00	0.35815312E-07	0.96326299E-06	0.40992018E-04	0.55373214E-03
15.00	0.38135962E-07	0.96094232E-06	0.40991697E-04	0.55291690E-03
16.00	0.38670102E-07	0.96240816E-06	0.40991159E-04	0.56126690E-03
17.00	0.36928942E-07	0.96214935E-06	0.40990912E-04	0.56516193E-03
18.00	0.37054026E-07	0.96202424E-06	0.40990781E-04	0.56707673E-03
19.00	0.37114216E-07	0.96196404E-06	0.40990722E-04	0.56799850E-03
20.00	0.37139468E-07	0.96193881E-06	0.40990693E-04	0.56839990E-03
21.00	0.37152581E-07	0.96192573E-06	0.40990679E-04	0.56861644E-03
22.00	0.37159200E-07	0.96191908E-06	0.40990679E-04	0.56870352E-03
23.00	0.37162721E-07	0.96191556E-06	0.40990664E-04	0.56874170E-03
24.00	0.37164707E-07	0.96191357E-06	0.40990664E-04	0.56877290E-03
25.00	0.37165666E-07	0.96191260E-06	0.40990664E-04	0.56878943E-03
26.00	0.37166156E-07	0.96191215E-06	0.40990664E-04	0.56879525E-03
27.00	0.37166423E-07	0.96191186E-06	0.40990664E-04	0.56879851E-03
28.00	0.37166554E-07	0.96191175E-06	0.40990664E-04	0.56880107E-03
29.00	0.37166622E-07	0.96191169E-06	0.40990664E-04	0.56880194E-03
30.00	0.37166661E-07	0.96191164E-06	0.40990664E-04	0.56880224E-03
31.00	0.37166682E-07	0.96191158E-06	0.40990664E-04	0.56880247E-03
32.00	0.37166693E-07	0.96191158E-06	0.40990664E-04	0.56880247E-03
33.00	0.37166700E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
34.00	0.37166703E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
35.00	0.37166703E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
36.00	0.37166703E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
37.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
38.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
39.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
40.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
41.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
42.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
43.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
44.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
45.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
46.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
47.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
48.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
49.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03
50.00	0.37166707E-07	0.96191158E-06	0.40990664E-04	0.56880270E-03

Figure 3-8. Sample Output of the Adiabatic Expansion Simulation for the Case of dP/dt vs. Time in Example 2 (Cont.)

Temperature	Time
288.0	0.
280.0	20.
280.0	50.
276.0	70.
276.0	80.
274.0	100.

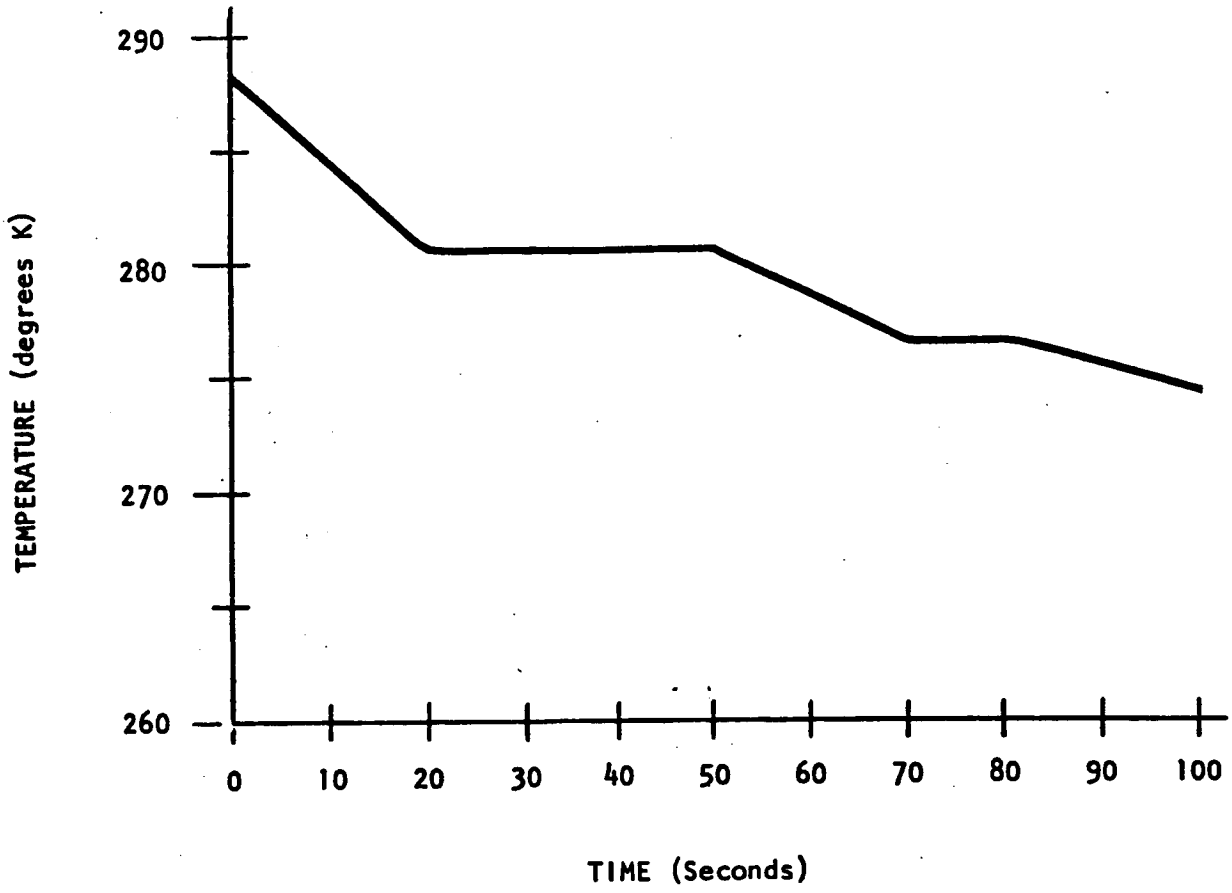


Figure 3-9. Driving Function of Temperature vs. Time for Example 3

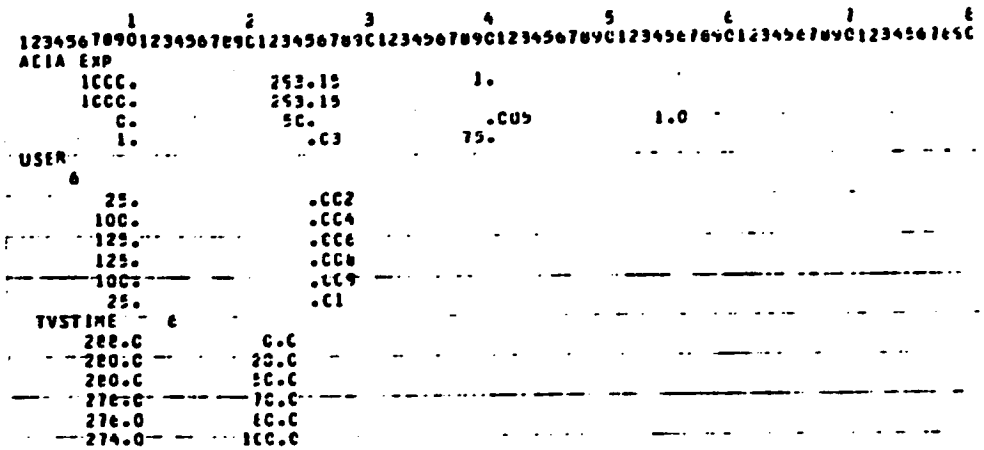


Figure 3-10. Input Card Images of Temperature vs. Time in Example 3

INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

INITIAL PRESSURE	0.10000 04	MB
INITIAL TEMPERATURE	0.29320 03	DEG K
INITIAL VOLUME	0.10000 01	CC
SATURATED PRESSURE	0.10000 04	MB
SATURATED TEMPERATURE	0.29320 03	DEG K
START TIME	0.0	SEC
END TIME	0.50000 02	SEC
INTEGRATION TIME INCREMENT	0.50000-02	SEC
PRINT TIME INCREMENT	0.10000 01	SEC
THERMAL CONDUCTIVITY COEFF.	0.10000 01	
CONDENSATION COEFFICIENT	0.30000-01	
SURFACE TENSION	0.75000 02	
DISTRIBUTION OPTION:	USER DEFINED FUNCTION	
NUMBER OF PARTICLE CLASSES	6	

# PART.	CRITICAL SIGMA (SUPERSATURATION)
0.25000 02	0.20000-02
0.10000 03	0.40000-02
0.12500 03	0.60000-02
0.12500 03	0.80000-02
0.10000 03	0.90000-02
0.25000 02	0.10000-01

PRESSURE OPTION: TEMPERATURE VS TIME

TEMPERATURE (DEG K)	TIME (SEC)
0.28800 03	0.0
0.28000 03	0.20000 02
0.28000 03	0.50000 02
0.27600 03	0.70000 02
0.27600 03	0.80000 02
0.27400 03	0.10000 03

CLASS	INIT. RAD.(CM)	CRIT SATUR	CRIT. RAD.(CM)
1	0.21337631D-04	0.10020000D 01	0.36957861D-04
2	0.10668816D-04	0.10040000D 01	0.18478931D-04
3	0.71125437D-05	0.10060000D 01	0.12319287D-04
4	0.53344078D-05	0.10080000D 01	0.92396633D-05
5	0.47416958D-05	0.10090000D 01	0.82128581D-05
6	0.42675262D-05	0.10100000D 01	0.73915722D-05

Figure 3-11. Sample Output of the Adiabatic Expansion Simulation for the Case of Temperature vs. Time in Example 3

DROPLET RADII(M) TIME HISTORY

TIME(SEC)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.6[illegible]479E-04	0.53560128E-04	0.43981330E-04	0.35699122E-04	0.31667427E-04	0.27699323E-04
2.00	0.1339[illegible]89E-03	0.17321952E-03	0.16664345E-03	0.16096044E-03	0.15817607E-03	0.15547771E-03
3.00	0.3159[illegible]702E-03	0.30154623E-03	0.30282303E-03	0.29877666E-03	0.29680366E-03	0.29491517E-03
4.00	0.4[illegible]337637E-03	0.43718868E-03	0.43347571E-03	0.43030619E-03	0.42876436E-03	0.42729476E-03
5.00	0.5[illegible]1e142E-03	0.55496464E-03	0.55165379E-03	0.54920278E-03	0.54791477E-03	0.54668775E-03
6.00	0.6[illegible]5B42E-03	0.65754960E-03	0.65522431E-03	0.65290416E-03	0.65177772E-03	0.65070414E-03
7.00	0.7[illegible]7626E-03	0.74564840E-03	0.74348296E-03	0.74138492E-03	0.74036676E-03	0.73939655E-03
8.00	0.8241611[illegible]E-03	0.82023803E-03	0.81805559E-03	0.81611425E-03	0.81517221E-03	0.81427488E-03
9.00	0.[illegible]79814E-03	0.88319904E-03	0.88105095E-03	0.87922439E-03	0.87833800E-03	0.87749399E-03
10.00	0.9[illegible]178E-03	0.93673286E-03	0.93488658E-03	0.93294750E-03	0.93210372E-03	0.93129999E-03
11.00	0.9[illegible]3E-03	0.98293577E-03	0.98059045E-03	0.97929966E-03	0.97848917E-03	0.97771734E-03
12.00	0.1[illegible]239E-02	0.10234381E-02	0.10213319E-02	0.10199228E-02	0.10191395E-02	0.10183933E-02
13.00	0.1[illegible]430E-02	0.10595485E-02	0.10977028E-02	0.10561342E-02	0.10553735E-02	0.10546408E-02
14.00	0.1[illegible]302E-02	0.10922132E-02	0.10904144E-02	0.10888854E-02	0.10881438E-02	0.10874376E-02
15.00	0.1[illegible]682E-02	0.11221389E-02	0.11203806E-02	0.11188861E-02	0.11181615E-02	0.11174714E-02
16.00	0.1[illegible]478E-02	0.11458586E-02	0.11481361E-02	0.11466721E-02	0.11459624E-02	0.11452863E-02
17.00	0.1[illegible]820E-02	0.11757466E-02	0.11740560E-02	0.11726196E-02	0.11719230E-02	0.11712597E-02
18.00	0.1[illegible]34E-02	0.12006867E-02	0.11964252E-02	0.11970135E-02	0.11963288E-02	0.11956771E-02
19.00	0.1[illegible]73E-02	0.12230548E-02	0.12214598E-02	0.12200705E-02	0.12193969E-02	0.12187555E-02
20.00	0.1[illegible]77E-02	0.12445357E-02	0.12433250E-02	0.12419568E-02	0.12412930E-02	0.12406611E-02
21.00	0.1[illegible]57E-02	0.12659428E-02	0.12563495E-02	0.12579958E-02	0.12573393E-02	0.12567143E-02
22.00	0.1[illegible]02E-02	0.12688213E-02	0.12672384E-02	0.12658897E-02	0.12652366E-02	0.12646150E-02
23.00	0.1[illegible]3E-02	0.12726539E-02	0.12710730E-02	0.12697298E-02	0.12690786E-02	0.12684586E-02
24.00	0.1[illegible]87E-02	0.12745196E-02	0.12729405E-02	0.12715990E-02	0.12709486E-02	0.12703289E-02
25.00	0.1[illegible]0E-02	0.12754363E-02	0.12738581E-02	0.12725173E-02	0.12718672E-02	0.12712481E-02
26.00	0.1[illegible]60E-02	0.12758910E-02	0.12743133E-02	0.12729729E-02	0.12723228E-02	0.12717040E-02
27.00	0.1[illegible]94E-02	0.12761026E-02	0.12745252E-02	0.12731848E-02	0.12725347E-02	0.12719161E-02
28.00	0.1[illegible]63E-02	0.12761995E-02	0.12746218E-02	0.12732816E-02	0.12726316E-02	0.12720127E-02
29.00	0.1[illegible]91E-02	0.12762460E-02	0.12746686E-02	0.12733282E-02	0.12726781E-02	0.12720595E-02
30.00	0.1[illegible]78E-02	0.12762707E-02	0.12746931E-02	0.12733527E-02	0.12727028E-02	0.12720840E-02
31.00	0.1[illegible]10E-02	0.12762838E-02	0.12747061E-02	0.12733657E-02	0.12727156E-02	0.12720968E-02
32.00	0.1[illegible]85E-02	0.12762912E-02	0.12747133E-02	0.12733729E-02	0.12727228E-02	0.12721040E-02
33.00	0.1[illegible]22E-02	0.12762949E-02	0.12747170E-02	0.12733764E-02	0.12727264E-02	0.12721075E-02
34.00	0.1[illegible]45E-02	0.12762970E-02	0.12747191E-02	0.12733785E-02	0.12727284E-02	0.12721093E-02
35.00	0.1[illegible]59E-02	0.12762984E-02	0.12747203E-02	0.12733797E-02	0.12727296E-02	0.12721105E-02
36.00	0.1[illegible]69E-02	0.12762991E-02	0.12747210E-02	0.12733801E-02	0.12727301E-02	0.12721110E-02
37.00	0.1[illegible]73E-02	0.12762996E-02	0.12747212E-02	0.12733804E-02	0.12727303E-02	0.12721112E-02
38.00	0.1[illegible]78E-02	0.12762998E-02	0.12747215E-02	0.12733806E-02	0.12727303E-02	0.12721114E-02
39.00	0.1[illegible]80E-02	0.12762998E-02	0.12747217E-02	0.12733806E-02	0.12727305E-02	0.12721112E-02
40.00	0.1[illegible]83E-02	0.12763001E-02	0.12747217E-02	0.12733806E-02	0.12727303E-02	0.12721112E-02
41.00	0.1[illegible]87E-02	0.12763003E-02	0.12747217E-02	0.12733806E-02	0.12727303E-02	0.12721112E-02
42.00	0.1[illegible]90E-02	0.12763003E-02	0.12747217E-02	0.12733806E-02	0.12727303E-02	0.12721110E-02
43.00	0.1[illegible]92E-02	0.12763005E-02	0.12747217E-02	0.12733806E-02	0.12727303E-02	0.12721110E-02
44.00	0.1[illegible]94E-02	0.12763005E-02	0.12747217E-02	0.12733806E-02	0.12727301E-02	0.12721110E-02
45.00	0.1[illegible]97E-02	0.12763005E-02	0.12747219E-02	0.12733804E-02	0.12727301E-02	0.12721107E-02
46.00	0.1[illegible]99E-02	0.12763008E-02	0.12747219E-02	0.12733804E-02	0.12727301E-02	0.12721107E-02
47.00	0.1[illegible]01E-02	0.12763008E-02	0.12747219E-02	0.12733804E-02	0.12727299E-02	0.12721105E-02
48.00	0.1[illegible]04E-02	0.12763010E-02	0.12747219E-02	0.12733804E-02	0.12727299E-02	0.12721105E-02
49.00	0.1[illegible]06E-02	0.12763010E-02	0.12747219E-02	0.12733804E-02	0.12727299E-02	0.12721103E-02
50.00	0.1[illegible]08E-02	0.12763010E-02	0.12747219E-02	0.12733801E-02	0.12727299E-02	0.12721103E-02

Figure 3-11. Sample Output of the Adiabatic Expansion Simulation for the Case of Temperature vs. Time in Example 3 (Cont.)

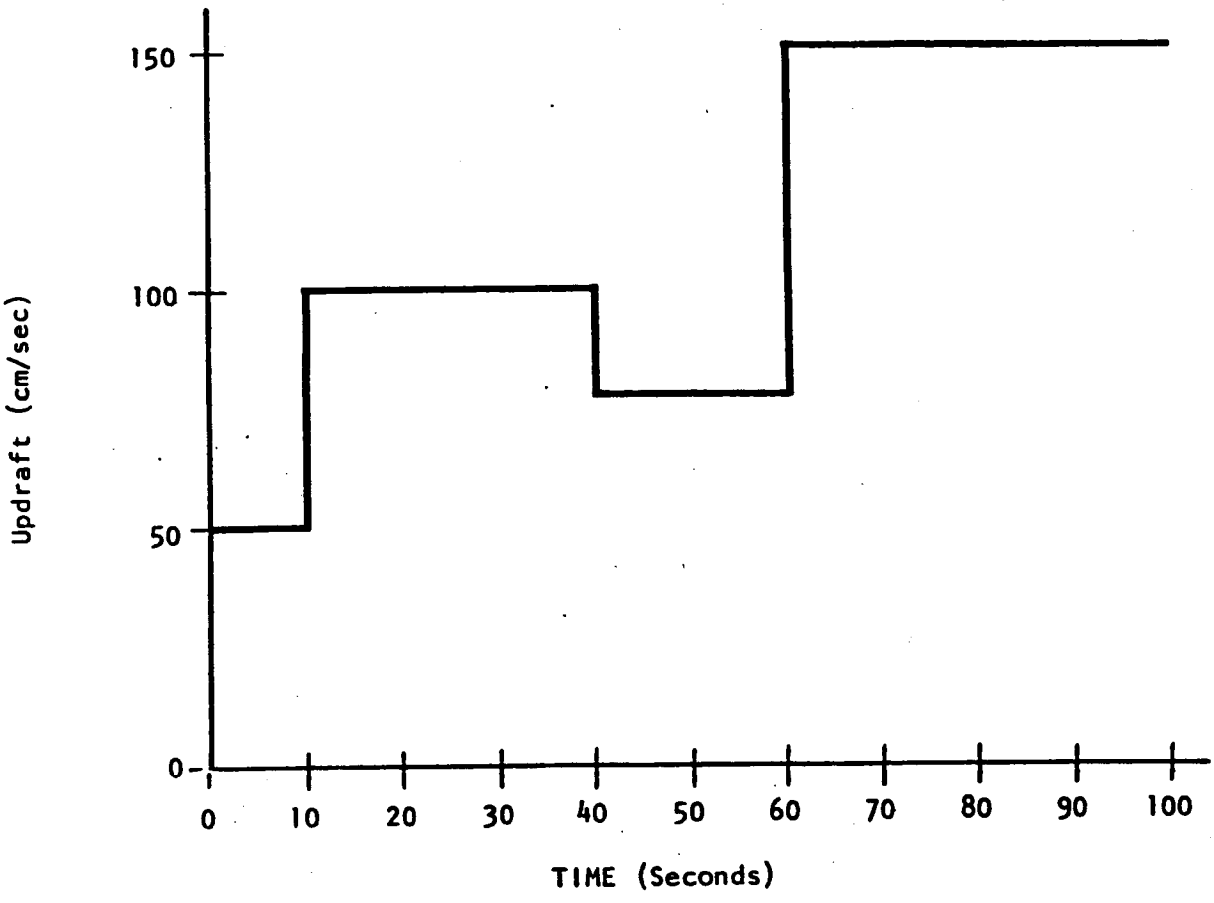
TIME(SEC)	P(MB)	V(CC)	S-1	T(K)
1.00	0.99321191E 03	0.10034389E 01	0.19349881E-01	0.29274978E 03
2.00	0.99021802E 03	0.10071096E 01	0.38332496E-01	0.29234985E 03
3.00	0.98729958E 03	0.10111730E 01	0.54366328E-01	0.29194995E 03
4.00	0.97686060E 03	0.10178661E 01	0.65087140E-01	0.29154980E 03
5.00	0.96781030E 03	0.10257235E 01	0.69809496E-01	0.29114990E 03
6.00	0.95749634E 03	0.10350151E 01	0.69472611E-01	0.29074976E 03
7.00	0.94642216E 03	0.10452976E 01	0.65860510E-01	0.29034985E 03
8.00	0.93519775E 03	0.10555807E 01	0.60704336E-01	0.28994995E 03
9.00	0.92404297E 03	0.10661411E 01	0.55274148E-01	0.28954980E 03
10.00	0.91317603E 03	0.10776396E 01	0.50285168E-01	0.28914990E 03
11.00	0.90266305E 03	0.10882883E 01	0.46046058E-01	0.28874976E 03
12.00	0.89249878E 03	0.10987759E 01	0.42587224E-01	0.28834985E 03
13.00	0.88265210E 03	0.11091232E 01	0.39831277E-01	0.28794995E 03
14.00	0.87307983E 03	0.11193657E 01	0.37642259E-01	0.28754980E 03
15.00	0.86374438E 03	0.11295388E 01	0.35893988E-01	0.28714990E 03
16.00	0.85461401E 03	0.11396666E 01	0.34477793E-01	0.28674976E 03
17.00	0.84566406E 03	0.11497784E 01	0.33310276E-01	0.28634985E 03
18.00	0.83687671E 03	0.11598892E 01	0.32328751E-01	0.28594995E 03
19.00	0.82823828E 03	0.11700106E 01	0.31487439E-01	0.28554980E 03
20.00	0.81973877E 03	0.11801510E 01	0.30753989E-01	0.28514990E 03
21.00	0.81618311E 03	0.11845346E 01	0.15868876E-01	0.28512476E 03
22.00	0.81453638E 03	0.11872025E 01	0.78084022E-02	0.28512476E 03
23.00	0.81372827E 03	0.11883183E 01	0.38604427E-02	0.28512476E 03
24.00	0.81333325E 03	0.11888647E 01	0.19323512E-02	0.28512476E 03
25.00	0.81313892E 03	0.11891336E 01	0.98329498E-03	0.28512476E 03
26.00	0.81304224E 03	0.11892672E 01	0.51221950E-03	0.28512476E 03
27.00	0.81299731E 03	0.11893291E 01	0.29291189E-03	0.28512476E 03
28.00	0.81297681E 03	0.11893578E 01	0.19270086E-03	0.28512476E 03
29.00	0.81296680E 03	0.11893721E 01	0.14437920E-03	0.28512476E 03
30.00	0.81296167E 03	0.11893787E 01	0.11892113E-03	0.28512476E 03
31.00	0.81295898E 03	0.11893826E 01	0.10546973E-03	0.28512476E 03
32.00	0.81295728E 03	0.11893845E 01	0.97950455E-04	0.28512476E 03
33.00	0.81295654E 03	0.11893864E 01	0.94168165E-04	0.28512476E 03
34.00	0.81295630E 03	0.11893864E 01	0.92081798E-04	0.28512476E 03
35.00	0.81295605E 03	0.11893864E 01	0.90861329E-04	0.28512476E 03
36.00	0.81295581E 03	0.11893873E 01	0.90215501E-04	0.28512476E 03
37.00	0.81295581E 03	0.11893873E 01	0.89853755E-04	0.28512476E 03
38.00	0.81295581E 03	0.11893873E 01	0.89671681E-04	0.28512476E 03
39.00	0.81295557E 03	0.11893873E 01	0.89571797E-04	0.28512476E 03
40.00	0.81295557E 03	0.11893873E 01	0.89513516E-04	0.28512476E 03
41.00	0.81295557E 03	0.11893873E 01	0.89483074E-04	0.28512476E 03
42.00	0.81295557E 03	0.11893873E 01	0.89466310E-04	0.28512476E 03
43.00	0.81295557E 03	0.11893873E 01	0.89456953E-04	0.28512476E 03
44.00	0.81295557E 03	0.11893873E 01	0.89452078E-04	0.28512476E 03
45.00	0.81295557E 03	0.11893873E 01	0.89449546E-04	0.28512476E 03
46.00	0.81295557E 03	0.11893873E 01	0.89448236E-04	0.28512476E 03
47.00	0.81295557E 03	0.11893873E 01	0.89447559E-04	0.28512476E 03
48.00	0.81295557E 03	0.11893873E 01	0.89447087E-04	0.28512476E 03
49.00	0.81295557E 03	0.11893873E 01	0.89446894E-04	0.28512476E 03
50.00	0.81295557E 03	0.11893873E 01	0.89446723E-04	0.28512476E 03

Figure 3-11. Sample Output of the Adiabatic Expansion Simulation for the Case of Temperature vs. Time in Example 3 (Cont.)

TIME(SEC)	MW(GM.MOLE)	MV(GM.MOLE)	MG(GM.MOLE)	MIXING RATIO
1.00	0.10147322E-10	0.95906762E-06	0.41027830E-04	0.15514731E-06
2.00	0.32657012E-09	0.95859103E-06	0.41027366E-04	0.80554237E-05
3.00	0.31960985E-08	0.95588166E-06	0.41024643E-04	0.48937582E-04
4.00	0.94185282E-08	0.94965575E-06	0.41018415E-04	0.14408030E-03
5.00	0.19469134E-07	0.93960915E-06	0.41008359E-04	0.29765419E-03
6.00	0.32623284E-07	0.92645502E-06	0.40995204E-04	0.49923500E-03
7.00	0.47684257E-07	0.91139401E-06	0.40980143E-04	0.72987145E-03
8.00	0.63539574E-07	0.89553868E-06	0.40964296E-04	0.97280229E-03
9.00	0.79394738E-07	0.87968351E-06	0.40948435E-04	0.12157962E-02
10.00	0.94815277E-07	0.86426303E-06	0.40933024E-04	0.14523407E-02
11.00	0.10962304E-06	0.84965520E-06	0.40918210E-04	0.16794806E-02
12.00	0.12381196E-06	0.83526279E-06	0.40904022E-04	0.18973129E-02
13.00	0.13743988E-06	0.82163242E-06	0.40890387E-04	0.21066258E-02
14.00	0.15059720E-06	0.80848105E-06	0.40877232E-04	0.23087671E-02
15.00	0.16336600E-06	0.79571225E-06	0.40864470E-04	0.25050139E-02
16.00	0.17581573E-06	0.78328252E-06	0.40852014E-04	0.26964224E-02
17.00	0.18799892E-06	0.77107933E-06	0.40839834E-04	0.28838134E-02
18.00	0.19995485E-06	0.75912340E-06	0.40827872E-04	0.30677717E-02
19.00	0.21171189E-06	0.74736636E-06	0.40816129E-04	0.32487379E-02
20.00	0.22329027E-06	0.73578803E-06	0.40804545E-04	0.34270172E-02
21.00	0.23204382E-06	0.72703443E-06	0.40795785E-04	0.35618059E-02
22.00	0.23642752E-06	0.72265273E-06	0.40791405E-04	0.36280815E-02
23.00	0.23858115E-06	0.72049716E-06	0.40789251E-04	0.36620542E-02
24.00	0.23963429E-06	0.71944396E-06	0.40788203E-04	0.36787562E-02
25.00	0.24015304E-06	0.71892521E-06	0.40787680E-04	0.36864011E-02
26.00	0.24041054E-06	0.71866771E-06	0.40787418E-04	0.36905573E-02
27.00	0.24053048E-06	0.71854777E-06	0.40787301E-04	0.36925797E-02
28.00	0.24058528E-06	0.71845297E-06	0.40787243E-04	0.36935243E-02
29.00	0.24061171E-06	0.71846654E-06	0.40787228E-04	0.36938574E-02
30.00	0.24062564E-06	0.71845261E-06	0.40787214E-04	0.36940984E-02
31.00	0.24063297E-06	0.71844528E-06	0.40787199E-04	0.36941864E-02
32.00	0.24063712E-06	0.71844113E-06	0.40787199E-04	0.36942377E-02
33.00	0.24063917E-06	0.71843908E-06	0.40787199E-04	0.36942610E-02
34.00	0.24064030E-06	0.71843795E-06	0.40787199E-04	0.36942870E-02
35.00	0.24064095E-06	0.71843726E-06	0.40787199E-04	0.36942987E-02
36.00	0.24064133E-06	0.71843692E-06	0.40787199E-04	0.36943029E-02
37.00	0.24064155E-06	0.71843670E-06	0.40787199E-04	0.36943054E-02
38.00	0.24064161E-06	0.71843664E-06	0.40787199E-04	0.36943073E-02
39.00	0.24064167E-06	0.71843658E-06	0.40787199E-04	0.36943078E-02
40.00	0.24064173E-06	0.71843652E-06	0.40787199E-04	0.36943082E-02
41.00	0.24064173E-06	0.71843652E-06	0.40787199E-04	0.36943085E-02
42.00	0.24064173E-06	0.71843652E-06	0.40787199E-04	0.36943085E-02
43.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
44.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
45.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
46.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
47.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
48.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
49.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02
50.00	0.24064178E-06	0.71843652E-06	0.40787199E-04	0.36943087E-02

Figure 3-11. Sample Output of the Adiabatic Expansion Simulation for the Case of Temperature vs. Time in Example 3 (Cont.)

Updraft	Time
50.	10.
100.	40.
75.	60.
150.	100.



NOTE: For each point, enter the time at the end of the interval.

Figure 3-12. Driving Function of Updraft vs. Time for Example 4

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
ACIA EXP
     1CCC.              253.15          1.
     1CCC.              253.15
       0.                50.                .C05              1.0
       1.                  .C3             75.
USER
  6
      25.                  .CC4
     100.                  .CC5
     125.                  .CCE
     125.                  .CCB
     100.                  .CC9
      25.                  .C1
UPCNFI    4
      5C.                 1C.
     1CC.                 4C.
      75.                 6C.
     150.                1CC.
```

Figure 3-13. Input Card Images of Updraft vs. Time for Example 4

```
     INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

 INITIAL PRESSURE                    0.10000 04 MB
 INITIAL TEMPERATURE                 0.2932D 03 DEG K
 INITIAL VOLUME                      0.10000 01 CC
 SATURATOR PRESSURE                  0.1000D 04 MB
 SATURATOR TEMPERATURE               0.2932D 03 DEG K
 START TIME                          0.0        SEC
 END TIME                            0.50000 02 SEC
 INTEGRATION TIME INCREMENT          0.5000D-02 SEC
 PRINT TIME INCREMENT                0.10000 01 SEC
 THERMAL CONDUCTIVITY COEFF.         0.1000D 01
 CONDENSATION COEFFICIENT            0.3000D+01
 SURFACE TENSION                     0.7500C 02
 DISTRIBUTION OPTION:   USER DEFINED FUNCTION
 NUMBER OF PARTICLE CLASSES          6
  # PART.     CRITICAL SIGMA (SUPERSATURATION)
    0.2500D 02                       0.2000D-02
    0.1000D 03                       0.4000D-02
    0.1250D 03                       0.6000D-02
    0.1250D 03                       0.8000D-02
    0.1000D 03                       0.9000D-02
    0.2500D 02                       0.1000D+01

 PRESSURE OPTION:  UPDRAFT VS TIME
      UPDRAFT          TIME
     (CM/SEC)         (SEC)
      0.5000 02      0.1000D 02
      0.1000 03      0.4000D 02
      0.7500 02      0.6000D 02
      0.1500 03      0.1000D 03

 CLASS      INIT. RAD.(CM)          CRIT SATUR          CRIT. RAD.(CM)
   1      0.21537631D-04      0.1002C000D 01      0.36957861D-04
   2      0.10668816D-04      0.1004C000D 01      0.18478931D-04
   3      0.711254370-05      0.1006C000D 01      0.12319287D-04
   4      0.53344678D-05      0.1008C000D 01      0.92394653D-05
   5      0.47416458D-05      0.100900000D 01     0.82128581D-05
   6      0.42675262D-05      0.1010000CD 01      0.73919722D-05
```

Figure 3-14. Sample Output of the Adiabatic Expansion Simulation for the Case of Updraft vs. Time in Example 4

TIME(SEC)	DROPLET RADII(CM) TIME HISTORY R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.21648637E-04	0.10788C0E-04	0.71665017E-05	0.53650674E-05	0.47659742E-05	0.42872180E-05
2.00	0.22231252E-04	0.10919335E-04	0.72244447E-05	0.53972108E-05	0.47912490E-05	0.43076097E-05
3.00	0.22848442E-04	0.11061707E-04	0.72848470E-05	0.54303573E-05	0.48172187E-05	0.43285036E-05
4.00	0.23556044E-04	0.11214039E-04	0.73479150E-05	0.54645870E-05	0.48439233E-05	0.43499249E-05
5.00	0.24381210E-04	0.11377809E-04	0.74138825E-05	0.54999082E-05	0.48714010E-05	0.43718992E-05
6.00	0.25360248E-04	0.11554152E-04	0.74830077E-05	0.55366517E-05	0.48996983E-05	0.43944528E-05
7.00	0.26547030E-04	0.11746803E-04	0.75556054E-05	0.55742812E-05	0.49288574E-05	0.44176177E-05
8.00	0.28025519E-04	0.11957113E-04	0.76320293E-05	0.56134868E-05	0.49589362E-05	0.44414246E-05
9.00	0.29923656E-04	0.12185C79E-04	0.77126797E-05	0.56541639E-05	0.49899872E-05	0.44659091E-05
10.00	0.32435302E-04	0.12447499E-04	0.77980339E-05	0.56964218E-05	0.50220724E-05	0.44911048E-05
11.00	0.36450117E-04	0.12978628E-04	0.79726688E-05	0.57816451E-05	0.50864583E-05	0.45414645E-05
12.00	0.43224645E-04	0.13763140E-04	0.81840199E-05	0.58789174E-05	0.51587949E-05	0.45973975E-05
13.00	0.53244512E-04	0.14894932E-04	0.84302301E-05	0.59854774E-05	0.52368232E-05	0.46570694E-05
14.00	0.66613737E-04	0.16772057E-04	0.87239296E-05	0.61031087E-05	0.53213998E-05	0.47209323E-05
15.00	0.82879735E-04	0.20587468E-04	0.90871171E-05	0.62340496E-05	0.54134916E-05	0.47894455E-05
16.00	0.10136291E-03	0.29364164E-04	0.95603718E-05	0.63811140E-05	0.55141418E-05	0.48630245E-05
17.00	0.12141139E-03	0.45856563E-04	0.10235303E-04	0.65473378E-05	0.56240651E-05	0.49417158E-05
18.00	0.14250381E-03	0.68186598E-04	0.11381443E-04	0.67352066E-05	0.57429388E-05	0.50246954E-05
19.00	0.16423340E-03	0.93187875E-04	0.14274258E-04	0.69467033E-05	0.58692258E-05	0.51102252E-05
20.00	0.18627689E-03	0.11905373E-03	0.25360225E-04	0.71832455E-05	0.59999911E-05	0.51956867E-05
21.00	0.20637466E-03	0.14490804E-03	0.50499904E-04	0.74410909E-05	0.61282617E-05	0.52760188E-05
22.00	0.23025948E-03	0.17026803E-03	0.80859507E-04	0.76997758E-05	0.62395893E-05	0.53423474E-05
23.00	0.25168573E-03	0.19480742E-03	0.11106552E-03	0.79163246E-05	0.63163907E-05	0.53862659E-05
24.00	0.27274443E-03	0.21825334E-03	0.13913814E-03	0.80277141E-05	0.63450571E-05	0.54015236E-05
25.00	0.29224115E-03	0.24055500E-03	0.16647376E-03	0.79810288E-05	0.63221096E-05	0.53876356E-05
26.00	0.31112158E-03	0.26145233E-03	0.19122340E-03	0.77961286E-05	0.62553036E-05	0.53486710E-05
27.00	0.32886514E-03	0.28109732E-03	0.21401834E-03	0.75500711E-05	0.61586976E-05	0.52911282E-05
28.00	0.34563758E-03	0.29923185E-03	0.23453660E-03	0.73032543E-05	0.60476276E-05	0.52225832E-05
29.00	0.36086726E-03	0.31603756E-03	0.25407621E-03	0.70779661E-05	0.59329859E-05	0.51495081E-05
30.00	0.37517678E-03	0.33192709E-03	0.27196738E-03	0.68791290E-05	0.58226989E-05	0.50766985E-05
31.00	0.38836017E-03	0.34578328E-03	0.28752163E-03	0.67070696E-05	0.57199941E-05	0.50069220E-05
32.00	0.40051527E-03	0.35882788E-03	0.30206935E-03	0.65580443F-05	0.56268291E-05	0.49420705E-05
33.00	0.41169696E-03	0.37081446E-03	0.31534350E-03	0.64301730E-05	0.55437731E-05	0.48830752E-05
34.00	0.42199204E-03	0.38181967E-03	0.32747397E-03	0.63205925E-05	0.54705060E-05	0.48301690E-05
35.00	0.43146152E-03	0.39153919E-03	0.33858255E-03	0.62268582E-05	0.54063757E-05	0.47832209E-05
36.00	0.44023572E-03	0.40123381E-03	0.34876936E-03	0.61465971E-05	0.53506391E-05	0.47418225E-05
37.00	0.44833613E-03	0.40985551E-03	0.35814638E-03	0.60775321E-05	0.53019221E-05	0.47055519E-05
38.00	0.45585423E-03	0.41782483E-03	0.36680861E-03	0.60191824E-05	0.52599007E-05	0.46739042E-05
39.00	0.46285754E-03	0.42523653E-03	0.37484430E-03	0.59688737E-05	0.52235691E-05	0.46463647E-05
40.00	0.46940451E-03	0.43215533E-03	0.38232794E-03	0.59257609E-05	0.51921881E-05	0.46224477E-05
41.00	0.47556695E-03	0.43865328E-03	0.38923277E-03	0.58706728E-05	0.51516190E-05	0.45912866E-05
42.00	0.48100925E-03	0.44439384E-03	0.39552199E-03	0.58209760E-05	0.51149926E-05	0.45627621E-05
43.00	0.48609567E-03	0.44974731E-03	0.40127547E-03	0.57796269E-05	0.50841045E-05	0.45391535E-05
44.00	0.49079419E-03	0.45468681E-03	0.40653736E-03	0.57460238E-05	0.50589470E-05	0.45199948E-05
45.00	0.49516442E-03	0.45927614E-03	0.41148812E-03	0.57183661E-05	0.50381477E-05	0.45033712E-05
46.00	0.49925991E-03	0.46357256E-03	0.41618210E-03	0.56954850E-05	0.50208782E-05	0.44898652E-05
47.00	0.50312327E-03	0.46762195E-03	0.42C40553E-03	0.56764829E-05	0.50064946E-05	0.44785520E-05
48.00	0.50679082E-03	0.47146296E-03	0.42450149E-03	0.56606277E-05	0.49944638E-05	0.44691491E-05
49.00	0.51029166E-03	0.47512678E-03	0.42840419E-03	0.56473382E-05	0.49843584E-05	0.44611588E-05
50.00	0.51365184E-03	0.47864066E-03	0.43214299E-03	0.56361314E-05	0.49758228E-05	0.44544768E-05

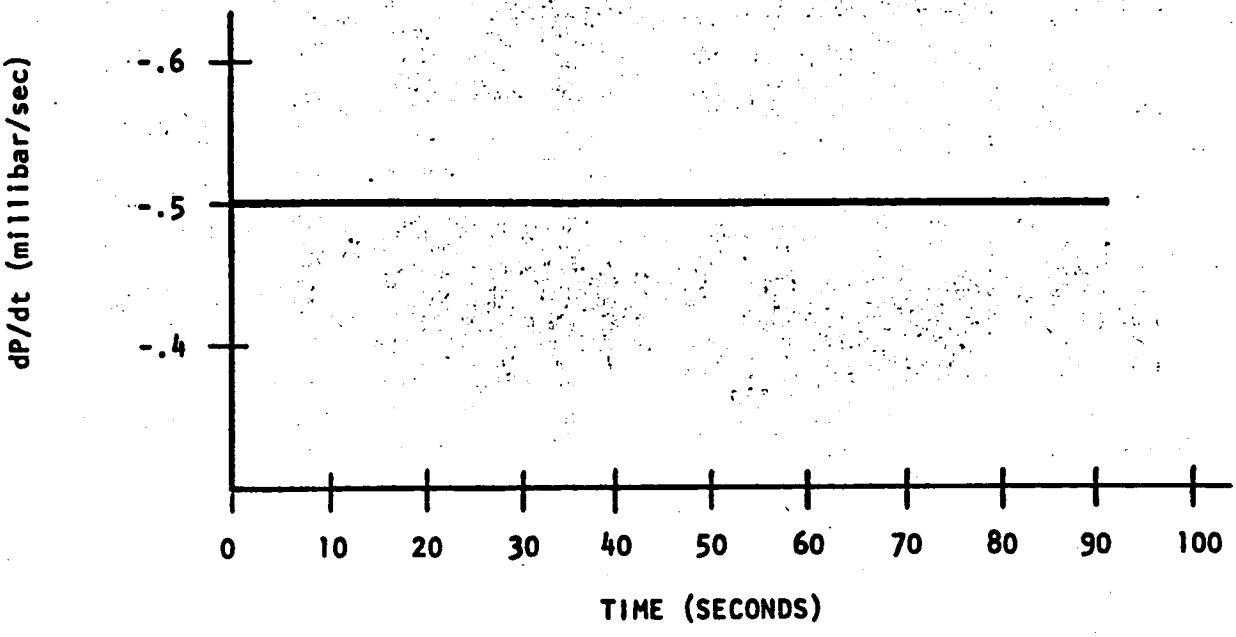
Figure 3-14. Sample Output of the Adiabatic Expansion Simulation for the Case of Updraft vs. Time in Example 4 (Cont.)

TIME(SEC)	P(MB)	V(CC)	S-1	T(K)
1.00	0.999939994E 03	0.100000429E 01	0.240222124E-03	0.293144978E 03
2.00	0.99987988E 03	0.10000858E 01	0.48049400E-03	0.293139789E 03
3.00	0.999819826E 03	0.100001287E 01	0.72082342E-03	0.293134777E 03
4.00	0.999759776E 03	0.10001717E 01	0.96121058E-03	0.293129866E 03
5.00	0.999699771E 03	0.10002146E 01	0.12016536E-02	0.293124976E 03
6.00	0.999639656E 03	0.100025756E 01	0.14421507E-02	0.293119987E 03
7.00	0.999579596E 03	0.10003004E 01	0.16826976E-02	0.293114972E 03
8.00	0.999519536E 03	0.10003433E 01	0.19232887E-02	0.293109966E 03
9.00	0.999459476E 03	0.10003862E 01	0.21639129E-02	0.293104976E 03
10.00	0.999399416E 03	0.10004292E 01	0.24045496E-02	0.293099985E 03
11.00	0.999283869E 03	0.100051211E 01	0.28688156E-02	0.293089039E 03
12.00	0.999163576E 03	0.10005980E 01	0.33503296E-02	0.293078008E 03
13.00	0.999043706E 03	0.10006838E 01	0.38311910E-02	0.293067007E 03
14.00	0.998923586E 03	0.10007706E 01	0.43108389E-02	0.293056006E 03
15.00	0.998803716E 03	0.10008564E 01	0.47880970E-02	0.293045005E 03
16.00	0.998683596E 03	0.10009422E 01	0.52608997E-02	0.293034024E 03
17.00	0.998563726E 03	0.10010290E 01	0.57246052E-02	0.293023027E 03
18.00	0.998443606E 03	0.10011168E 01	0.61704963E-02	0.293012075E 03
19.00	0.998323736E 03	0.10012045E 01	0.65878034E-02	0.293001147E 03
20.00	0.998203866E 03	0.10012941E 01	0.69654882E-02	0.292990269E 03
21.00	0.998083746E 03	0.10013847E 01	0.72874762E-02	0.292979463E 03
22.00	0.997963876E 03	0.10014791E 01	0.75308383E-02	0.292968730E 03
23.00	0.997843996E 03	0.10015755E 01	0.76788999E-02	0.292958096E 03
24.00	0.997724126E 03	0.10016747E 01	0.77261478E-02	0.292947583E 03
25.00	0.997604256E 03	0.10017776E 01	0.76761320E-02	0.292937192E 03
26.00	0.997484386E 03	0.10018835E 01	0.75390413E-02	0.292926899E 03
27.00	0.997364506E 03	0.10019913E 01	0.73275045E-02	0.292916680E 03
28.00	0.997244636E 03	0.10021009E 01	0.70579797E-02	0.292906533E 03
29.00	0.997124766E 03	0.10022125E 01	0.67471936E-02	0.292896436E 03
30.00	0.997004886E 03	0.10023241E 01	0.64111017E-02	0.292886362E 03
31.00	0.996885256E 03	0.10024357E 01	0.60620755E-02	0.292876313E 03
32.00	0.996765386E 03	0.10025482E 01	0.57120509E-02	0.292866240E 03
33.00	0.996645516E 03	0.10026608E 01	0.53704679E-02	0.292856191E 03
34.00	0.996525886E 03	0.10027723E 01	0.50441287E-02	0.292846094E 03
35.00	0.996406016E 03	0.10028830E 01	0.47376491E-02	0.292835995E 03
36.00	0.996286386E 03	0.10029936E 01	0.44535138E-02	0.292825874E 03
37.00	0.996166506E 03	0.10031033E 01	0.41933507E-02	0.292815703E 03
38.00	0.996046886E 03	0.10032120E 01	0.39574020E-02	0.292805532E 03
39.00	0.995927256E 03	0.10033197E 01	0.37450714E-02	0.292795313E 03
40.00	0.995807626E 03	0.10034275E 01	0.35552065E-02	0.292785068E 03
41.00	0.995712166E 03	0.10035162E 01	0.32977068E-02	0.292774995E 03
42.00	0.995622316E 03	0.10036001E 01	0.30559713E-02	0.292764946E 03
43.00	0.995532476E 03	0.10036821E 01	0.28497276E-02	0.292756826E 03
44.00	0.99544287E 03	0.10037642E 01	0.26746304E-02	0.292747026E 03
45.00	0.995353036E 03	0.10038443E 01	0.25263915E-02	0.292739507E 03
46.00	0.995263436E 03	0.10039244E 01	0.24008933E-02	0.292731312E 03
47.00	0.995173586E 03	0.10040045E 01	0.22946680E-02	0.292723092E 03
48.00	0.995083986E 03	0.10040827E 01	0.22046235E-02	0.292715872E 03
49.00	0.994994136E 03	0.10041618E 01	0.21281526E-02	0.292708604E 03
50.00	0.994904546E 03	0.10042400E 01	0.20629514E-02	0.292703335E 03

Figure 3-14. Sample Output of the Adiabatic Expansion Simulation for the Case of Updraft vs. Time in Example 4 (Cont.)

TIME(SEC)	NW(GM/MOLE)	NA(GM/MOLE)	NG(GM/MOLE)	MIXING RATIO
1.00	0.10673423E-12	0.95907762E-06	0.41027830E-04	0.16325330E-08
2.00	0.11271257E-12	0.95907762E-06	0.41027830E-04	0.17239710E-08
3.00	0.11980049E-12	0.95907762E-06	0.41027830E-04	0.18322484E-08
4.00	0.12820702E-12	0.95907762E-06	0.41027830E-04	0.19608699E-08
5.00	0.13840096E-12	0.95907762E-06	0.41027830E-04	0.21161765E-08
6.00	0.15110710E-12	0.95907762E-06	0.41027830E-04	0.23094406E-08
7.00	0.16745719E-12	0.95907762E-06	0.41027830E-04	0.25613130E-08
8.00	0.18927796E-12	0.95907762E-06	0.41027830E-04	0.28946092E-08
9.00	0.22003813E-12	0.95907762E-06	0.41027830E-04	0.33651630E-08
10.00	0.26802765E-12	0.95907762E-06	0.41027830E-04	0.40687951E-08
11.00	0.35663101E-12	0.95907762E-06	0.41027830E-04	0.54547975E-08
12.00	0.55615495E-12	0.95907762E-06	0.41027830E-04	0.85065857E-08
13.00	0.98260115E-12	0.95907671E-06	0.41027830E-04	0.15025536E-07
14.00	0.18587337E-11	0.95907581E-06	0.41027830E-04	0.28426840E-07
15.00	0.35463186E-11	0.95907399E-06	0.41027830E-04	0.54239941E-07
16.00	0.66811496E-11	0.95907126E-06	0.41027830E-04	0.10219054E-06
17.00	0.12689297E-10	0.95906489E-06	0.41027815E-04	0.19408644E-06
18.00	0.24246008E-10	0.95905398E-06	0.41027815E-04	0.37084504E-06
19.00	0.44656709E-10	0.95903306E-06	0.41027786E-04	0.68304342E-06
20.00	0.77301138E-10	0.95900032E-06	0.41027757E-04	0.11823522E-05
21.00	0.12710218E-09	0.95895120E-06	0.41027713E-04	0.19441140E-05
22.00	0.20108255E-09	0.95887663E-06	0.41027626E-04	0.30757026E-05
23.00	0.30434388E-09	0.95877385E-06	0.41027524E-04	0.46555970E-05
24.00	0.43855786E-09	0.95863925E-06	0.41027393E-04	0.67079964E-05
25.00	0.60262817E-09	0.95847554E-06	0.41027233E-04	0.92220034E-05
26.00	0.79342333E-09	0.95828455E-06	0.41027044E-04	0.12139772E-04
27.00	0.10070713E-08	0.95807081E-06	0.41026826E-04	0.15406098E-04
28.00	0.12385248E-08	0.95783289E-06	0.41026593E-04	0.18946193E-04
29.00	0.14826567E-08	0.95759515E-06	0.41026346E-04	0.22683816E-04
30.00	0.17345727E-08	0.95736322E-06	0.41026098E-04	0.26536451E-04
31.00	0.19904747E-08	0.95708765E-06	0.41025836E-04	0.30447033E-04
32.00	0.22466986E-08	0.95683117E-06	0.41025589E-04	0.34366256E-04
33.00	0.25003404E-08	0.95657742E-06	0.41025327E-04	0.38245242E-04
34.00	0.27493050E-08	0.95632822E-06	0.41025080E-04	0.42056257E-04
35.00	0.29921716E-08	0.95606539E-06	0.41024847E-04	0.45769397E-04
36.00	0.32281697E-08	0.95584583E-06	0.41024599E-04	0.49378810E-04
37.00	0.34567957E-08	0.95562064E-06	0.41024381E-04	0.52875839E-04
38.00	0.36779697E-08	0.95539963E-06	0.41024163E-04	0.56258985E-04
39.00	0.38918699E-08	0.95516590E-06	0.41023945E-04	0.59531201E-04
40.00	0.40988581E-08	0.95497944E-06	0.41023741E-04	0.62697252E-04
41.00	0.42965596E-08	0.95478117E-06	0.41023537E-04	0.65722154E-04
42.00	0.44824379E-08	0.95459563E-06	0.41023348E-04	0.68563648E-04
43.00	0.46573412E-08	0.95442610E-06	0.41023173E-04	0.71238537E-04
44.00	0.48226489E-08	0.95425548E-06	0.41023013E-04	0.73769770E-04
45.00	0.49796824E-08	0.95405814E-06	0.41022853E-04	0.76171258E-04
46.00	0.51297064E-08	0.95394807E-06	0.41022708E-04	0.78466517E-04
47.00	0.52737867E-08	0.95380437E-06	0.41022562E-04	0.80671176E-04
48.00	0.54128790E-08	0.95366539E-06	0.41022417E-04	0.82798926E-04
49.00	0.55477827E-08	0.95353C50E-06	0.41022286E-04	0.84861764E-04
50.00	0.56792118E-08	0.95339908E-06	0.41022155E-04	0.86872562E-04

Figure 3-14. Sample Output of the Adiabatic Expansion Simulation for the Case of Updraft vs. Time in Example 4 (Cont.)



This example requires no further input data; the function PFUNCT is sufficient. However, the user may submit a function requiring further input data.

Figure 3-15. Driving Function Specified by the User for Example 5

```
      DOUBLE PRECISION FUNCTION PFUNCT(TIME)
      IMPLICIT REAL *8 (A - H, O - Z)
C
C     DPDT HAS UNITS OF MILLIBARS
C
      DPDT = -.5
      PFUNCT = 1000.  * DPDT
C
      RETURN
      END
```

Figure 3-16. FORTRAN User's Function for Computing dP/dt In Example 5

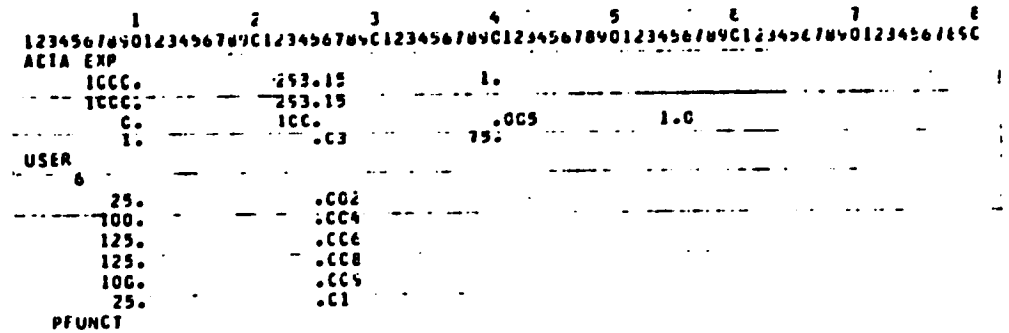


Figure 3-17. Card Images for User's Function in Example 5

INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

INITIAL PRESSURE	0.10000 04 MB
INITIAL TEMPERATURE	0.29320 03 DEG K
INITIAL VOLUME	0.10000 01 CC
SATURATOR PRESSURE	0.10000 04 MB
SATURATOR TEMPERATURE	0.29320 03 DEG K
START TIME	0.0 SEC
END TIME	0.10000 03 SEC
INTEGRATION TIME INCREMENT	0.50000-02 SEC
PRINT TIME INCREMENT	0.10000 01 SEC
THERMAL CONDUCTIVITY COEFF.	0.10000 01
CONDENSATION COEFFICIENT	0.30000-01
SURFACE TENSION	0.75000 02
DISTRIBUTION OPTION:	USER DEFINED FUNCTION
NUMBER OF PARTICLE CLASSES	6

# PART.	CRITICAL SIGMA TSUPERSATURATION)
0.25000 02	0.20000-02
0.10000 03	0.40000-02
0.12500 03	0.60000-02
0.12500 03	0.80000-02
0.10000 03	0.90000-02
0.25000 02	0.10000-01

PRESSURE OPTION: USER INPUT FUNCTION FOR DP/DT

CLASS	INIT. RAD.(CM)	CRIT SATUR	CRIT. RAD.(CM)
1	0.21337831D-04	0.10020000 01	0.36957861D-04
2	0.10668816D-04	0.10040000 01	0.18478931D-04
3	0.71123437D-05	0.10060000 01	0.12319287D-04
4	0.53344078D-05	0.10080000 01	0.92396453D-05
5	0.47416958D-05	0.10090000 01	0.82128581D-05
6	0.42675262D-05	0.10100000 01	0.73915722D-05

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function in Example 5

TIME(SEC)	DROPLET RADII(CM) TIME HISTORY R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.44691176E-04	0.11846058E-04	0.76321148E-05	0.56199278E-05	0.49650771E-05	0.44469334E-05
2.00	0.33396398E-04	0.14332335E-04	0.84651510E-05	0.60157035E-05	0.52610922E-05	0.46766345E-05
3.00	0.51549009E-04	0.22162494E-04	0.10226861E-04	0.66307566E-05	0.56856907E-05	0.49881583E-05
4.00	0.83696675E-04	0.48405432E-04	0.18776453E-04	0.79722049E-05	0.64273281E-05	0.54672073E-05
5.00	0.11724253E-03	0.85033180E-04	0.53260315E-04	0.18667299E-04	0.92096998E-05	0.64968199E-05
6.00	0.13777244E-03	0.12902828E-03	0.10059937E-03	0.64843509E-04	0.43066998E-04	0.19547544E-04
7.00	0.14945182E-03	0.17363999E-03	0.14865871E-03	0.11784874E-03	0.98652337E-04	0.75185511E-04
8.00	0.24001964E-03	0.21654296E-03	0.19471774E-03	0.16754691E-03	0.15095290E-03	0.13084005E-03
9.00	0.27769589E-03	0.25673443E-03	0.23658904E-03	0.21223706E-03	0.19752965E-03	0.17988548E-03
10.00	0.31196536E-03	0.29236125E-03	0.27377694E-03	0.25148806E-03	0.23812985E-03	0.22221626E-03
11.00	0.34201029E-03	0.32364405E-03	0.30615972E-03	0.28540101E-03	0.27302536E-03	0.25835284E-03
12.00	0.36807056E-03	0.35022025E-03	0.33411791E-03	0.31441287E-03	0.30276835E-03	0.28900895E-03
13.00	0.39051054E-03	0.37366179E-03	0.35765977E-03	0.33914112E-03	0.32805349E-03	0.31498284E-03
14.00	0.40983246E-03	0.39354176E-03	0.37829275E-03	0.36026887E-03	0.34961454E-03	0.33707637E-03
15.00	0.42656413E-03	0.41072513E-03	0.39592152E-03	0.37845364E-03	0.36814366E-03	0.35602762E-03
16.00	0.44120126E-03	0.42573549E-03	0.41125859E-03	0.39428589E-03	0.38425718E-03	0.37248363E-03
17.00	0.45417459E-03	0.43902383E-03	0.42489497E-03	0.40826364E-03	0.39846962E-03	0.38698129E-03
18.00	0.46583312E-03	0.45095314E-03	0.43718854E-03	0.42078361E-03	0.41118939E-03	0.39994367E-03
19.00	0.47645718E-03	0.46181469E-03	0.44818153E-03	0.43216092E-03	0.42274082E-03	0.41170581E-03
20.00	0.48626168E-03	0.47183107E-03	0.45840349E-03	0.44263550E-03	0.43336954E-03	0.42252056E-03
21.00	0.49541169E-03	0.48117246E-03	0.46793092E-03	0.45239017E-03	0.44326298E-03	0.43258118E-03
22.00	0.50403085E-03	0.48995694E-03	0.47685513E-03	0.46156184E-03	0.45256084E-03	0.44203107E-03
23.00	0.51221205E-03	0.49831020E-03	0.48535485E-03	0.47025294E-03	0.46136812E-03	0.45097829E-03
24.00	0.52002515E-03	0.50627440E-03	0.49350481E-03	0.47854055E-03	0.46976353E-03	0.45950292E-03
25.00	0.52752439E-03	0.51391521E-03	0.50128228E-03	0.48648426E-03	0.47780783E-03	0.46766805E-03
26.00	0.53474982E-03	0.52127405E-03	0.50876965E-03	0.49412788E-03	0.48554396E-03	0.47551980E-03
27.00	0.54173205E-03	0.52838330E-03	0.51600044E-03	0.50150626E-03	0.49301353E-03	0.48309425E-03
28.00	0.54847894E-03	0.53526550E-03	0.52300189E-03	0.50864741E-03	0.50023943E-03	0.49042120E-03
29.00	0.55500825E-03	0.54193314E-03	0.52976519E-03	0.51557389E-03	0.50724600E-03	0.49752393E-03
30.00	0.56145736E-03	0.54851216E-03	0.53639826E-03	0.52230363E-03	0.51403211E-03	0.50442130E-03
31.00	0.56768946E-03	0.55477885E-03	0.54282602E-03	0.52885246E-03	0.52067381E-03	0.51113032E-03
32.00	0.57376965E-03	0.56054816E-03	0.54911926E-03	0.53523364E-03	0.52712485E-03	0.51766471E-03
33.00	0.57967543E-03	0.56697009E-03	0.55520516E-03	0.54145884E-03	0.53341710E-03	0.52403659E-03
34.00	0.58566686E-03	0.57282419E-03	0.56117773E-03	0.54753805E-03	0.53956057E-03	0.53025642E-03
35.00	0.59113163E-03	0.57866813E-03	0.56701689E-03	0.55347988E-03	0.54556411E-03	0.53633354E-03
36.00	0.59667719E-03	0.58423961E-03	0.57273032E-03	0.55929250E-03	0.55143586E-03	0.54227831E-03
37.00	0.60211029E-03	0.58975560E-03	0.57832571E-03	0.56498311E-03	0.55718397E-03	0.54809242E-03
38.00	0.60743699E-03	0.59516262E-03	0.58380933E-03	0.57059894E-03	0.56281476E-03	0.55378908E-03
39.00	0.61266217E-03	0.60046557E-03	0.58918633E-03	0.57602464E-03	0.56833401E-03	0.55937190E-03
40.00	0.61779120E-03	0.60566957E-03	0.59446204E-03	0.58138650E-03	0.57374756E-03	0.56484668E-03
41.00	0.62282849E-03	0.61077974E-03	0.59964159E-03	0.58664964E-03	0.57906052E-03	0.57021878E-03
42.00	0.62777847E-03	0.61580073E-03	0.60472973E-03	0.59181848E-03	0.58427179E-03	0.57549356E-03
43.00	0.63264486E-03	0.62073558E-03	0.60973014E-03	0.59689721E-03	0.58940332E-03	0.58067497E-03
44.00	0.63743140E-03	0.62558893E-03	0.61464682E-03	0.60189003E-03	0.59444178E-03	0.58576721E-03
45.00	0.64214133E-03	0.63036382E-03	0.61948341E-03	0.60680066E-03	0.59939642E-03	0.59077446E-03
46.00	0.64677792E-03	0.63506374E-03	0.62424317E-03	0.61163236E-03	0.60427058E-03	0.59570000E-03
47.00	0.65134419E-03	0.63969125E-03	0.62892912E-03	0.61638816E-03	0.60906867E-03	0.60054730E-03
48.00	0.65584268E-03	0.64424961E-03	0.63354452E-03	0.62107155E-03	0.61379297E-03	0.60531939E-03
49.00	0.66027581E-03	0.64874114E-03	0.63809147E-03	0.62568486E-03	0.61844545E-03	0.61001908E-03
50.00	0.66466627E-03	0.65316865E-03	0.64257300E-03	0.63023088E-03	0.62303012E-03	0.61464938E-03
51.00	0.66895620E-03	0.65753423E-03	0.64699119E-03	0.63471217E-03	0.62754890E-03	0.61921263E-03

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function in Example 5 (Cont.)

DRGPLEY RADITICHI TIME HISTORY

TIME(SEC)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
52.00	0.67320792E-03	0.66184020E-03	0.65134862E-03	0.63913106E-03	0.63200458E-03	0.62371162E-03
53.00	0.67760330E-03	0.66608866E-03	0.65554737E-03	0.64348965E-03	0.63639903E-03	0.62814844E-03
54.00	0.68154442E-03	0.67028147E-03	0.65988931E-03	0.64779026E-03	0.64073456E-03	0.63252542E-03
55.00	0.68563293E-03	0.67442673E-03	0.66407654E-03	0.65203477E-03	0.64501306E-03	0.63684420E-03
56.00	0.68967044E-03	0.67850784E-03	0.66821044E-03	0.65622479E-03	0.64923634E-03	0.64110709E-03
57.00	0.69365883E-03	0.68254466E-03	0.67229336E-03	0.66036242E-03	0.65340861E-03	0.64531574E-03
58.00	0.69759949E-03	0.68653282E-03	0.67632645E-03	0.66444883E-03	0.65752491E-03	0.64947177E-03
59.00	0.70149382E-03	0.69047371E-03	0.68031112E-03	0.66848611E-03	0.66159340E-03	0.65357704E-03
60.00	0.70534321E-03	0.69436873E-03	0.68424921E-03	0.67247543E-03	0.66561324E-03	0.65763295E-03
61.00	0.70914906E-03	0.69821965E-03	0.68814191E-03	0.67641842E-03	0.66958601E-03	0.66164113E-03
62.00	0.71291253E-03	0.70202653E-03	0.69199060E-03	0.68031647E-03	0.67351334E-03	0.66560297E-03
63.00	0.71663503E-03	0.70579187E-03	0.69579649E-03	0.68417079E-03	0.67739631E-03	0.66951965E-03
64.00	0.72031748E-03	0.70951646E-03	0.69956086E-03	0.68798242E-03	0.68123615E-03	0.67339279E-03
65.00	0.72396128E-03	0.71320147E-03	0.70328498E-03	0.69175288E-03	0.68503409E-03	0.67722332E-03
66.00	0.72756712E-03	0.71684807E-03	0.70696976E-03	0.69548306E-03	0.68879151E-03	0.68101264E-03
67.00	0.73113618E-03	0.72045694E-03	0.71061639E-03	0.69917436E-03	0.69250911E-03	0.68476168E-03
68.00	0.73466935E-03	0.72402926E-03	0.71422546E-03	0.70282747E-03	0.69618854E-03	0.68847160E-03
69.00	0.73816767E-03	0.72756596E-03	0.71779848E-03	0.70644356E-03	0.69983001E-03	0.69214357E-03
70.00	0.74163196E-03	0.73106820E-03	0.72133611E-03	0.71002357E-03	0.70343516E-03	0.69577829E-03
71.00	0.74506318E-03	0.73453744E-03	0.72483951E-03	0.71356841E-03	0.70700468E-03	0.69937692E-03
72.00	0.74846181E-03	0.73797163E-03	0.72830915E-03	0.71707903E-03	0.71053952E-03	0.70294016E-03
73.00	0.75182901E-03	0.74137468E-03	0.73174597E-03	0.72056813E-03	0.71404036E-03	0.70646917E-03
74.00	0.75516524E-03	0.74474630E-03	0.73515088E-03	0.72400039E-03	0.71750814E-03	0.70996443E-03
75.00	0.75847143E-03	0.74808719E-03	0.73852460E-03	0.72741299E-03	0.72094358E-03	0.71342709E-03
76.00	0.76174806E-03	0.75139804E-03	0.74186758E-03	0.73079416E-03	0.72434754E-03	0.71685784E-03
77.00	0.76499605E-03	0.75467979E-03	0.74518099E-03	0.73414529E-03	0.72772079E-03	0.72025741E-03
78.00	0.76821609E-03	0.75793290E-03	0.74846530E-03	0.73746638E-03	0.73106401E-03	0.72362623E-03
79.00	0.77140843E-03	0.76115783E-03	0.75172097E-03	0.74075861E-03	0.73437789E-03	0.72696549E-03
80.00	0.77457400E-03	0.76435553E-03	0.75494894E-03	0.74402243E-03	0.73766289E-03	0.73027541E-03
81.00	0.77771302E-03	0.76752645E-03	0.75814966E-03	0.74725831E-03	0.74091973E-03	0.73355692E-03
82.00	0.78082667E-03	0.77067106E-03	0.76132361E-03	0.75046718E-03	0.74414909E-03	0.73681050E-03
83.00	0.78391493E-03	0.77379006E-03	0.76447148E-03	0.75364928E-03	0.74735144E-03	0.74003683E-03
84.00	0.78697852E-03	0.77688391E-03	0.76759397E-03	0.75680553E-03	0.75052772E-03	0.74323663E-03
85.00	0.79001789E-03	0.77995332E-03	0.77069132E-03	0.75993617E-03	0.75367792E-03	0.74641011E-03
86.00	0.79303375E-03	0.78299851E-03	0.77376422E-03	0.76304190E-03	0.75680297E-03	0.74955798E-03
87.00	0.79602708E-03	0.78602019E-03	0.77681313E-03	0.76612318E-03	0.75990334E-03	0.75268010E-03
88.00	0.79899584E-03	0.78901858E-03	0.77983853E-03	0.76918025E-03	0.76297953E-03	0.75577898E-03
89.00	0.80194348E-03	0.79199439E-03	0.78284089E-03	0.77221403E-03	0.76603168E-03	0.75885328E-03
90.00	0.80486899E-03	0.79494785E-03	0.78582042E-03	0.77522476E-03	0.76906085E-03	0.76190382E-03
91.00	0.80777309E-03	0.79787942E-03	0.78877807E-03	0.77821268E-03	0.77206688E-03	0.76493109E-03
92.00	0.81065623E-03	0.80078957E-03	0.79171360E-03	0.78117871E-03	0.77505064E-03	0.76793577E-03
93.00	0.81351865E-03	0.80367876E-03	0.79462817E-03	0.78412285E-03	0.77801244E-03	0.77091833E-03
94.00	0.81636081E-03	0.80654747E-03	0.79752156E-03	0.78704557E-03	0.78095263E-03	0.77387877E-03
95.00	0.81918295E-03	0.80939592E-03	0.80039445E-03	0.78994757E-03	0.78387183E-03	0.77681802E-03
96.00	0.82198554E-03	0.81222435E-03	0.80324709E-03	0.79282885E-03	0.78676967E-03	0.77973609E-03
97.00	0.82476903E-03	0.81503321E-03	0.80607994E-03	0.79568988E-03	0.78964746E-03	0.78263343E-03
98.00	0.82753366E-03	0.81782269E-03	0.80889324E-03	0.79853111E-03	0.79250522E-03	0.78551052E-03
99.00	0.83027966E-03	0.82059391E-03	0.81168744E-03	0.80135302E-03	0.79534343E-03	0.78836782E-03
100.00	0.83300751E-03	0.82334620E-03	0.81446301E-03	0.80415560E-03	0.79816207E-03	0.79120533E-03

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function in Example 5 (Cont.)

TIME(SEC)	P(MB)	V(CC)	S-I	T(K)
1.00	0.999499976E 03	0.100039576E 01	0.200236246E-02	0.293108815E 03
2.00	0.99899976E 03	0.10007153E 01	0.40093400E-02	0.293066641E 03
3.00	0.99849976E 03	0.1C01C738E 01	0.60193278E-02	0.293024666E 03
4.00	0.99799976E 03	0.10014334E 01	0.80222636E-02	0.292982891E 03
5.00	0.99749976E 03	0.100179339E 01	0.99708028E-02	0.292942214E 03
6.00	0.99699976E 03	0.10021620E 01	0.11724025E-01	0.292903336E 03
7.00	0.99649976E 03	0.100254444E 01	0.13021179E-01	0.292866987E 03
8.00	0.99599976E 03	0.10029478E 01	0.13661124E-01	0.292845451E 03
9.00	0.99549976E 03	0.100337731E 01	0.13625611E-01	0.292825520E 03
10.00	0.99499976E 03	0.10038157E 01	0.13039548E-01	0.292812174E 03
11.00	0.99449976E 03	0.100426686E 01	0.12095474E-01	0.292804446E 03
12.00	0.99399976E 03	0.10047283E 01	0.10986529E-01	0.292797895E 03
13.00	0.99349976E 03	0.100518889E 01	0.98649301E-02	0.292791975E 03
14.00	0.99299976E 03	0.1CC56C467E 01	0.88279136E-02	0.292784442E 03
15.00	0.99249976E 03	0.100610016E 01	0.79238825E-02	0.292777563E 03
16.00	0.99199976E 03	0.1C0655117E 01	0.71679987E-02	0.292769514E 03
17.00	0.99149976E 03	0.100699971E 01	0.65519921E-02	0.292752793E 03
18.00	0.99099976E 03	0.10C744406E 01	0.60576014E-02	0.292739508E 03
19.00	0.99049976E 03	0.10C788026E 01	0.56636222E-02	0.292726485E 03
20.00	0.98999976E 03	0.1CC833179E C1	0.53494684E-02	0.292709471E 03
21.00	0.98949976E 03	0.100887547E 01	0.50572030E-02	0.292693122E 03
22.00	0.98899976E 03	0.1CC941696E 01	0.48921928E-02	0.292676271E 03
23.00	0.98849976E 03	0.10098245E 01	0.47229752E-02	0.292659188E 03
24.00	0.98799976E C3	0.10100584E 01	0.45808032E-02	0.292641606E 03
25.00	0.98749976E 03	0.101049423E 01	0.445899574E-02	0.292623786E 03
26.00	0.98699976E 03	0.10109253E 01	0.43528E02E-02	0.292605906E 03
27.00	0.98649976E 03	0.1C113592E 01	0.42588711E-02	0.292587865E 03
28.00	0.98599976E 03	0.10117631E 01	0.41743964E-02	0.292569581E 03
29.00	0.98549976E 03	0.101222771E 01	0.405761071E-02	0.292551271E 03
30.00	0.98499976E 03	0.1C126610E 01	0.40271319E-02	0.292532711E 03
31.00	0.98449976E 03	0.101309959E 01	0.39619133E-02	0.292514106E 03
32.00	0.98399976E 03	0.1C1352998E 01	0.39011675E-02	0.292495615E 03
33.00	0.98349976E 03	0.101396647E 01	0.384429899E-02	0.292477105E 03
34.00	0.98299976E 03	0.1C1440005E 01	0.37908284E-02	0.292458505E 03
35.00	0.98249976E 03	0.1C1483354E 01	0.37403961E-02	0.292439770E 03
36.00	0.98199976E C3	0.1C1527112E 01	0.36926749E-02	0.292420906E 03
37.00	0.98149976E 03	0.101570800E 01	0.364739400E-02	0.292402346E 03
38.00	0.98099976E 03	0.1C1614386E 01	0.36043322E-02	0.292383306E 03
39.00	0.98049976E 03	0.1C1658806E 01	0.356331499E-02	0.292364506E 03
40.00	0.97999976E 03	0.10170183E 01	0.35241661E-02	0.292345706E 03
41.00	0.97949976E 03	0.101745361E 01	0.348673606E-02	0.292326666E 03
42.00	0.97899976E 03	0.10178938E 01	0.34508547E-02	0.292307866E 03
43.00	0.97849976E 03	0.1C1833315E 01	0.341653666E-02	0.292288882E 03
44.00	0.97799976E 03	0.1C1877C2E C1	0.33835517E-02	0.292269781E 03
45.00	0.97749976E 03	0.1C1920B9E 01	0.335184746E-02	0.292250736E 03
46.00	0.97699976E 03	0.1C196486E C1	0.33213464E-02	0.292231696E 03
47.00	0.97649976E 03	0.102008826E 01	0.329196876E-02	0.292212656E 03
48.00	0.97599976E 03	0.10205278E 01	0.326364326E-02	0.292193606E 03
49.00	0.97549976E 03	0.102056846E 01	0.323631246E-02	0.292174326E 03
50.00	0.97499976E 03	0.10214090E 01	0.320991526E-02	0.292155276E 03
51.00	0.97449976E 03	0.1C218390E 01	0.318439886E-02	0.292135996E 03

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function in Example 5 (Cont.)

TIME(SEC)	P(ABS)	V(CC)	S-1	T(K)
52.00	0.973999976E 03	0.102229216 01	0.31997149E-02	0.292116706 03
53.00	0.973499976E 03	0.102273376 01	0.31358167E-02	0.292097606 03
54.00	0.972999976E 03	0.102317626 01	0.31126637E-02	0.292078376 03
55.00	0.972499976E 03	0.102361876 01	0.30902198E-02	0.292059006 03
56.00	0.971999976E 03	0.102406226 01	0.30684478E-02	0.292039796 03
57.00	0.971499976E 03	0.102450566 01	0.30473138E-02	0.292020516 03
58.00	0.970999976E 03	0.102494916 01	0.30267893E-02	0.292001226 03
59.00	0.970499976E 03	0.102539356 01	0.30068445E-02	0.291981696 03
60.00	0.969999976E 03	0.102583896 01	0.29874523E-02	0.291962406 03
61.00	0.969499976E 03	0.102628336 01	0.29685877E-02	0.291943126 03
62.00	0.968999976E 03	0.102672866 01	0.29502284E-02	0.291923856 03
63.00	0.968499976E 03	0.102717496 01	0.29323474E-02	0.291904306 03
64.00	0.967999976E 03	0.102762136 01	0.29149300E-02	0.291884776 03
65.00	0.967499976E 03	0.102806766 01	0.28979545E-02	0.291865436 03
66.00	0.966999976E 03	0.102851496 01	0.28814026E-02	0.291845956 03
67.00	0.966499976E 03	0.102896216 01	0.28652577E-02	0.291826426 03
68.00	0.965999976E 03	0.102941046 01	0.28495027E-02	0.291806886 03
69.00	0.965499976E 03	0.102985866 01	0.28341231E-02	0.291787356 03
70.00	0.964999976E 03	0.103030686 01	0.28191039E-02	0.291767826 03
71.00	0.964499976E 03	0.103075606 01	0.28044318E-02	0.291748296 03
72.00	0.963999976E 03	0.103120526 01	0.27900937E-02	0.291728766 03
73.00	0.963499976E 03	0.103165536 01	0.27760773E-02	0.291708966 03
74.00	0.962999976E 03	0.103210546 01	0.27623710E-02	0.291689656 03
75.00	0.962499976E 03	0.103255656 01	0.27489637E-02	0.291669946 03
76.00	0.961999976E 03	0.103300766 01	0.27358448E-02	0.291650136 03
77.00	0.961499976E 03	0.103345976 01	0.27230047E-02	0.291630626 03
78.00	0.960999976E 03	0.103391086 01	0.27104337E-02	0.291610846 03
79.00	0.960499976E 03	0.103436376 01	0.26981225E-02	0.291591316 03
80.00	0.959999976E 03	0.103481676 01	0.26860631E-02	0.291571536 03
81.00	0.959499976E 03	0.103526976 01	0.26742467E-02	0.291551706 03
82.00	0.958999976E 03	0.103572376 01	0.26626659E-02	0.291531986 03
83.00	0.958499976E 03	0.103617766 01	0.26513131E-02	0.291512216 03
84.00	0.957999976E 03	0.103663166 01	0.26401810E-02	0.291492606 03
85.00	0.957499976E 03	0.103708656 01	0.26292629E-02	0.291472706 03
86.00	0.956999976E 03	0.103754236 01	0.26185522E-02	0.291452886 03
87.00	0.956499976E 03	0.103799726 01	0.26080427E-02	0.291433116 03
88.00	0.955999976E 03	0.103845416 01	0.25977285E-02	0.291413336 03
89.00	0.955499976E 03	0.103891096 01	0.25876036E-02	0.291393556 03
90.00	0.954999976E 03	0.103936776 01	0.25776629E-02	0.291373786 03
91.00	0.954499976E 03	0.103982456 01	0.25679010E-02	0.291353376 03
92.00	0.953999976E 03	0.104028326 01	0.25583126E-02	0.291333986 03
93.00	0.953499976E 03	0.104074106 01	0.25488930E-02	0.291313906 03
94.00	0.952999976E 03	0.104119976 01	0.25396373E-02	0.291294196 03
95.00	0.952499976E 03	0.104165846 01	0.25305415E-02	0.291274176 03
96.00	0.951999976E 03	0.104211816 01	0.25216010E-02	0.291254156 03
97.00	0.951499976E 03	0.104257876 01	0.25128117E-02	0.291234386 03
98.00	0.950999976E 03	0.104303936 01	0.25041697E-02	0.291214366 03
99.00	0.950499976E 03	0.104349996 01	0.24956709E-02	0.291194346 03
100.00	0.949999976E 03	0.104396066 01	0.24873118E-02	0.291174326 03

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function in Example 5 (Cont.)

TIME(SEC)	NWIGH.MOLE)	AVIGH.MOLE)	NGIGH.MOLE)	MIXING RATIO
1.00	0.14777383E-12	0.95907762E-06	0.41027830E-04	0.225d7[illegible]E-08
2.00	0.31373721E-12	0.95907762E-06	0.41027830E-04	0.47961670E-08
3.00	0.11002666E-11	0.95907671E-06	0.41027830E-04	0.16811374E-07
4.00	0.55981253E-11	0.95907217E-06	0.41027830E-04	0.85609429E-07
5.00	0.28292216E-10	0.95904943E-06	0.41027801E-04	0.4327322[illegible]E-06
6.00	0.11216682E-09	0.95896576E-06	0.41027728E-04	0.17156190E-05
7.00	0.33649927E-09	0.95874111E-06	0.41027495E-04	0.5146[illegible]E-05
8.00	0.76265331E-09	0.95831547E-06	0.41027073E-04	0.11655962E-04
9.00	0.13939037E-08	0.95768428E-06	0.41026433E-04	0.21320[illegible]E-04
10.00	0.21938171E-08	0.95688392E-06	0.41025647E-04	0.33356658E-04
11.00	0.31031613E-08	0.95597443E-06	0.41024730E-04	0.4746[illegible]E-04
12.00	0.40631321E-08	0.95501491E-06	0.41023770E-04	0.62151070E-04
13.00	0.50273101E-08	0.95405085E-06	0.41022809E-04	0.76900[illegible]E-04
14.00	0.59659584E-08	0.95311231E-06	0.41021864E-04	0.91256195E-04
15.00	0.68642052E-08	0.95221407E-06	0.41020976E-04	0.10499[illegible]E-03
16.00	0.77173290E-08	0.95136C96E-06	0.41020117E-04	0.11805334E-03
17.00	0.8527806GE-08	0.95055C49E-06	0.41019302E-04	0.13045[illegible]E-03
18.00	0.93011858E-08	0.94977707E-06	0.41018531E-04	0.14228557E-03
19.00	0.10043944E-07	0.94903436E-06	0.41017789E-04	0.15364[illegible]E-03
20.00	0.10762374E-07	0.94831591E-06	0.41017076E-04	0.16466200E-03
21.00	0.11461967E-07	0.94761634E-06	0.41016378E-04	0.17534[illegible]E-03
22.00	0.12147211E-07	0.94693110E-06	0.41015694E-04	0.18583091E-03
23.00	0.12821612E-07	0.94625670E-06	0.41015010E-04	0.19615[illegible]E-03
24.00	0.13487853E-07	0.94559044E-06	0.41014340E-04	0.20634[illegible]E-03
25.00	0.14147969E-07	0.94493032E-06	0.41013685E-04	0.21644591E-03
26.00	0.14803454E-07	0.94427486E-06	0.41013031E-04	0.22647613E-03
27.00	0.15455328E-07	0.94362298E-06	0.41012376E-04	0.23645136E-03
28.00	0.16104419E-07	0.94297388E-06	0.41011735E-04	0.24638618E-03
29.00	0.16751290E-07	0.94232701E-06	0.41011081E-04	0.25628321E-03
30.00	0.17396363E-07	0.94168195E-06	0.41010440E-04	0.26615300E-03
31.00	0.18039959E-07	0.94103831E-06	0.41009800E-04	0.27600443E-03
32.00	0.18682321E-07	0.94039598E-06	0.41009159E-04	0.28583501E-03
33.00	0.19323629E-07	0.93975467E-06	0.41008518E-04	0.29564975E-03
34.00	0.19964030E-07	0.93911427E-06	0.41007865E-04	0.30545099E-03
35.00	0.20603636E-07	0.93847467E-06	0.41007224E-04	0.31523948E-03
36.00	0.21242549E-07	0.93783575E-06	0.41006599E-04	0.32501877E-03
37.00	0.21880851E-07	0.93719746E-06	0.41005958E-04	0.33478011E-03
38.00	0.22518605E-07	0.93655967E-06	0.41005318E-04	0.34454954E-03
39.00	0.23155877E-07	0.93592240E-06	0.41004678E-04	0.35430375E-03
40.00	0.23792712E-07	0.93528558E-06	0.41004037E-04	0.36405120E-03
41.00	0.24429156E-07	0.93464911E-06	0.41003412E-04	0.37379307E-03
42.00	0.25065291E-07	0.93401303E-06	0.41002771E-04	0.38352981E-03
43.00	0.25701027E-07	0.93337724E-06	0.41002131E-04	0.39326190E-03
44.00	0.26336522E-07	0.93274178E-06	0.41001491E-04	0.40298980E-03
45.00	0.26971762E-07	0.93210650E-06	0.41000865E-04	0.41271397E-03
46.00	0.27606777E-07	0.93147150E-06	0.41000225E-04	0.42243665E-03
47.00	0.28241573E-07	0.93083673E-06	0.40999599E-04	0.43215253E-03
48.00	0.28876190E-07	0.93020208E-06	0.40998959E-04	0.44186786E-03
49.00	0.29510641E-07	0.92956765E-06	0.40998319E-04	0.45158[illegible]E-03
50.00	0.30144944E-07	0.92893333E-06	0.40997693E-04	0.46129152E-03
51.00	0.30779116E-07	0.92829919E-06	0.40997053E-04	0.47100033E-03

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function In Example 5 (Cont.)

TIME(SEC)	NW(GM.MOLE)	AV(GM.MOLE)	NG(GM.MOLE)	MIXING RATIO
52.00	0.31413173E-07	0.92766510E-06	0.40996427E-04	0.48070773E-03
53.00	0.32047126E-07	0.92703118E-06	0.40995787E-04	0.49041973E-03
54.00	0.32680987E-07	0.92639732E-06	0.40995146E-04	0.50011854E-03
55.00	0.33314770E-07	0.92576352E-06	0.40994521E-04	0.50982228E-03
56.00	0.33948488E-07	0.92512983E-06	0.40993880E-04	0.51952526E-03
57.00	0.34582147E-07	0.92449613E-06	0.40993255E-04	0.52922731E-03
58.00	0.35215759E-07	0.92386250E-06	0.40992614E-04	0.53892913E-03
59.00	0.35849332E-07	0.92322898E-06	0.40991988E-04	0.54863069E-03
60.00	0.36482874E-07	0.92259540E-06	0.40991348E-04	0.55833138E-03
61.00	0.37116394E-07	0.92196188E-06	0.40990722E-04	0.56803226E-03
62.00	0.37749899E-07	0.92132836E-06	0.40990082E-04	0.57773315E-03
63.00	0.38383391E-07	0.92069490E-06	0.40989456E-04	0.58743381E-03
64.00	0.39016886E-07	0.92006138E-06	0.40988816E-04	0.59713493E-03
65.00	0.39650381E-07	0.91942792E-06	0.40988190E-04	0.60683603E-03
66.00	0.40283886E-07	0.91879440E-06	0.40987550E-04	0.61653764E-03
67.00	0.40917403E-07	0.91816088E-06	0.40986910E-04	0.62623969E-03
68.00	0.41550944E-07	0.91752736E-06	0.40986284E-04	0.63594221E-03
69.00	0.42184507E-07	0.91689378E-06	0.40985644E-04	0.64564520E-03
70.00	0.42818098E-07	0.91626021E-06	0.40985018E-04	0.65534888E-03
71.00	0.43451720E-07	0.91562657E-06	0.40984378E-04	0.66505303E-03
72.00	0.44085382E-07	0.91499288E-06	0.40983752E-04	0.67475811E-03
73.00	0.44719084E-07	0.91435919E-06	0.40983112E-04	0.68446412E-03
74.00	0.45352827E-07	0.91372544E-06	0.40982486E-04	0.69417089E-03
75.00	0.45986621E-07	0.91309170E-06	0.40981846E-04	0.70387847E-03
76.00	0.46620464E-07	0.91245784E-06	0.40981220E-04	0.71358704E-03
77.00	0.47254360E-07	0.91182392E-06	0.40980580E-04	0.72329670E-03
78.00	0.47888314E-07	0.91119000E-06	0.40979940E-04	0.73300744E-03
79.00	0.48522327E-07	0.91055597E-06	0.40979314E-04	0.74271928E-03
80.00	0.49156402E-07	0.90992188E-06	0.40978673E-04	0.75243227E-03
81.00	0.49790543E-07	0.90928773E-06	0.40978048E-04	0.76214543E-03
82.00	0.50424749E-07	0.90865353E-06	0.40977407E-04	0.77186170E-03
83.00	0.51059023E-07	0.90801927E-06	0.40976782E-04	0.78157829E-03
84.00	0.51693373E-07	0.90738490E-06	0.40976141E-04	0.79129613E-03
85.00	0.52327792E-07	0.90675047E-06	0.40975501E-04	0.80101518E-03
86.00	0.52962289E-07	0.90611599E-06	0.40974875E-04	0.81073586E-03
87.00	0.53596864E-07	0.90548144E-06	0.40974235E-04	0.82045770E-03
88.00	0.54231517E-07	0.90484679E-06	0.40973609E-04	0.83018094E-03
89.00	0.54866252E-07	0.90421202E-06	0.40972969E-04	0.83990581E-03
90.00	0.55501072E-07	0.90357725E-06	0.40972329E-04	0.84963185E-03
91.00	0.56135974E-07	0.90294230E-06	0.40971703E-04	0.85935976E-03
92.00	0.56770961E-07	0.90230731E-06	0.40971063E-04	0.86908881E-03
93.00	0.57406037E-07	0.90167225E-06	0.40970423E-04	0.87881950E-03
94.00	0.58041202E-07	0.90103708E-06	0.40969797E-04	0.88855182E-03
95.00	0.58676456E-07	0.90040186E-06	0.40969157E-04	0.89828554E-03
96.00	0.59311802E-07	0.89976646E-06	0.40968516E-04	0.90802112E-03
97.00	0.59947240E-07	0.89913107E-06	0.40967891E-04	0.91775809E-03
98.00	0.60582749E-07	0.89849550E-06	0.40967250E-04	0.92749670E-03
99.00	0.61218373E-07	0.89785988E-06	0.40966610E-04	0.93723717E-03
100.00	0.61854109E-07	0.89722414E-06	0.40965984E-04	0.94697904E-03

* END SIMULATION *

Figure 3-18. Sample Output of the Adiabatic Expansion Simulation for the Case of User's Function in Example 5 (Cont.)

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
ACIA EXP
      1000.              300.15              1.
      1000.              255.75
         0.              90.                 .0003             1.0
         1.                 .03              75.
GAUSSIAN
     21 .00000122         .00000244           2.16
      4.7619
      4.7619
      4.7619
```

INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

INITIAL PRESSURE	0.10000 04 MB
INITIAL TEMPERATURE	0.3002D 03 DEG K
INITIAL VOLUME	0.1000D 01 CC
SATURATOR PRESSURE	0.1000D 04 MB
SATURATOR TEMPERATURE	0.2998D 03 DEG K
START TIME	0.0 SEC
END TIME	0.5000D 02 SEC
INTEGRATION TIME INCREMENT	0.5000D-02 SEC
PRINT TIME INCREMENT	0.1000D 01 SEC
THERMAL CONDUCTIVITY COEFF.	0.1000D 01
CONDENSATION COEFFICIENT	0.3000D-01
SURFACE TENSION	0.7500D 02
DISTRIBUTION OPTION:	GAUSSIAN
NUMBER OF PARTICLE CLASSES	21
MEAN DRY RADIUS	0.1220D-05 CM
HALF WIDTH	0.2440D-06 CM
DENSITY OF AEROSOL	0.2160D 01 GR/CC

CLASS	NUMBER OF PARTICLES
1	0.4762D 01
2	0.4762D 01
3	0.4762D 01
4	0.4762D 01
5	0.4762D 01
6	0.4762D 01
7	0.4762D 01
8	0.4762D 01
9	0.4762D 01
10	0.4762D 01
11	0.4762D 01
12	0.4762D 01
13	0.4762D 01
14	0.4762D 01
15	0.4762D 01
16	0.4762D 01
17	0.4762D 01
18	0.4762D 01
19	0.4762D 01
20	0.4762D 01
21	0.4762D 01

PRESSURE OPTION: DP/DT VS TIME

DP/DT (MB)	TIME (SEC)
-0.6700 00	0.5000D 02

CLASS	DRY AEROSOL NUCLEI RADIUS
1	0.4184D-06
2	0.8564D-06
3	0.9298D-06
4	0.9826D-06
5	0.1026D-05
6	0.1064D-05
7	0.1098D-05
8	0.1130D-05
9	0.1161D-05
10	0.1191D-05
11	0.1220D-05
12	0.1249D-05
13	0.1279D-05

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6

14	0.1310D-05
15	0.1342D-05
16	0.1376D-05
17	0.1414D-05
18	0.1457D-05
19	0.1510D-05
20	0.1584D-05
21	0.2022D-05

CLASS	INIT. RAD.(CM)	CRIT SATUR	CRIT. RAD.(CM)
1	0.871073520-06	0.104391710 01	0.164382030-05
2	0.227748C90-05	0.101499710 01	0.481370940-05
3	0.253061660-05	0.101325720 01	0.546549960-05
4	0.271462600-05	0.101220330 01	0.591576730-05
5	0.286704690-05	0.101143690 01	0.631219500-05
6	0.300079590-05	0.101083130 01	0.666512900-05
7	0.312264570-05	0.101032680 01	0.699075050-05
8	0.323697940-05	0.100988960 01	0.729976240-05
9	0.334636250-05	0.100950080 01	0.759854230-05
10	0.345202420-05	0.100914780 01	0.789170750-05
11	0.355771710-05	0.100882060 01	0.818444550-05
12	0.366038420-05	0.100851250 01	0.848071630-05
13	0.377018470-05	0.100821790 01	0.878467880-05
14	0.388102970-05	0.100793120 01	0.910223480-05
15	0.399754930-05	0.100764800 01	0.943927270-05
16	0.412250140-05	0.100736330 01	0.980434210-05
17	0.426059000-05	0.100706920 01	0.102121340-04
18	0.441920900-05	0.100675570 01	0.106861210-04
19	0.461259060-05	0.100640460 01	0.112719440-04
20	0.488232360-05	0.100596460 01	0.121034570-04
21	0.650899180-05	0.100413520 01	0.174577700-04

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

DROPLET RADIICM) TIME HISTORY

TIME(SEC)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.87832285E-06	0.23148859E-05	0.25748195E-05	0.27639508E-05	0.29207195E-05	0.30583542E-05
2.00	0.88590247E-06	0.23555322E-05	0.26230882E-05	0.28179902E-05	0.29796711E-05	0.31217105E-05
3.00	0.89383451E-06	0.23958446E-05	0.26698953E-05	0.28774193E-05	0.30446827E-05	0.31917389E-05
4.00	0.90215269E-06	0.24485080E-05	0.27344340E-05	0.29433595E-05	0.31170512E-05	0.32699063E-05
5.00	0.91086311E-06	0.25023846E-05	0.27961657E-05	0.30172596E-05	0.31984737E-05	0.33581427E-05
6.00	0.92000708E-06	0.25626123E-05	0.28731192E-05	0.31010977E-05	0.32912885E-05	0.34591349E-05
7.00	0.92961236E-06	0.26307416E-05	0.29571656E-05	0.31976842E-05	0.33988630E-05	0.35767907E-05
8.00	0.94009442E-06	0.27085682E-05	0.30549927E-05	0.33112010E-05	0.35262947E-05	0.37171198E-05
9.00	0.95100825E-06	0.28005416E-05	0.31715881E-05	0.34482773E-05	0.36818492E-05	0.38900425E-05
10.00	0.96263011E-06	0.29109786E-05	0.33152410E-05	0.36203719E-05	0.38802891E-05	0.41138283E-05
11.00	0.97505290E-06	0.30478750E-05	0.35013773E-05	0.38501548E-05	0.41524145E-05	0.44284507E-05
12.00	0.98838243E-06	0.32256030E-05	0.37643449E-05	0.41939620E-05	0.45830320E-05	0.49955868E-05
13.00	0.10026833E-05	0.34964896E-05	0.42124766E-05	0.48906140E-05	0.56886438E-05	0.69126263E-05
14.00	0.10176791E-05	0.39996385E-05	0.50822391E-05	0.30539377E-04	0.93758180E-04	0.70044392E-04
15.00	0.10326412E-05	0.31853953E-04	0.95257233E-04	0.12391039E-03	0.14145357E-03	0.15362489E-03
16.00	0.10466729E-05	0.13754697E-03	0.18329990E-03	0.20505834E-03	0.21880926E-03	0.22851957E-03
17.00	0.10589511E-05	0.22341793E-03	0.25968254E-03	0.27754973E-03	0.28901873E-03	0.29719411E-03
18.00	0.10688318E-05	0.29785675E-03	0.32845698E-03	0.34381310E-03	0.35375729E-03	0.36088470E-03
19.00	0.10758940E-05	0.36453130E-03	0.39134617E-03	0.40494697E-03	0.41380222E-03	0.42017084E-03
20.00	0.10799931E-05	0.42517018E-03	0.44924719E-03	0.46154601E-03	0.46958285E-03	0.47537638E-03
21.00	0.10812728E-05	0.48068422E-03	0.50268206E-03	0.51397597E-03	0.52137510E-03	0.52671833E-03
22.00	0.10800959E-05	0.53162733E-03	0.55200397E-03	0.56250347E-03	0.56939549E-03	0.57437876E-03
23.00	0.10769454E-05	0.57841628E-03	0.59750141E-03	0.60736178E-03	0.61384402E-03	0.61853533E-03
24.00	0.10723134E-05	0.62142522E-03	0.63949335E-03	0.64879633E-03	0.65494090E-03	0.65939152E-03
25.00	0.10664964E-05	0.66096223E-03	0.67815557E-03	0.68705622E-03	0.69291890E-03	0.69716782E-03
26.00	0.10607438E-05	0.69742464E-03	0.71385689E-03	0.72238944E-03	0.72801393E-03	0.73209195E-03
27.00	0.10544501E-05	0.73101372E-03	0.74682501E-03	0.75504393E-03	0.76046470E-03	0.76439651E-03
28.00	0.10488602E-05	0.76203654E-03	0.77731418E-03	0.78526279E-03	0.79050777E-03	0.79431362E-03
29.00	0.10431316E-05	0.79075317E-03	0.80556795E-03	0.81328140E-03	0.81837340E-03	0.82206912E-03
30.00	0.10377844E-05	0.81740529E-03	0.83181472E-03	0.83932187E-03	0.84427934E-03	0.84787863E-03
31.00	0.10328513E-05	0.84221549E-03	0.85626706E-03	0.86359191E-03	0.86843059E-03	0.87194401E-03
32.00	0.10283557E-05	0.86538726E-03	0.87912031E-03	0.88622263E-03	0.89101917E-03	0.89449198E-03
33.00	0.10242939E-05	0.88710408E-03	0.90055168E-03	0.90756780E-03	0.91220485E-03	0.91557298E-03
34.00	0.10206459E-05	0.90753287E-03	0.92072249E-03	0.92760660E-03	0.93215727E-03	0.93546323E-03
35.00	0.10173617E-05	0.92682079E-03	0.93577572E-03	0.94653945E-03	0.95101143E-03	0.95426058E-03
36.00	0.10144695E-05	0.94505334E-03	0.95783337E-03	0.96446720E-03	0.96888701E-03	0.97208400E-03
37.00	0.10118729E-05	0.96246437E-03	0.97500696E-03	0.98155928E-03	0.98589274E-03	0.98904176E-03
38.00	0.10095591E-05	0.97903493E-03	0.99139474E-03	0.99789300E-03	0.10021250E-02	0.10052298E-02
39.00	0.10074937E-05	0.99485023E-03	0.10070801E-02	0.10134510E-02	0.10176657E-02	0.10207291E-02
40.00	0.10056483E-05	0.10101069E-02	0.10221377E-02	0.10284272E-02	0.10325881E-02	0.10356128E-02
41.00	0.10039930E-05	0.10247533E-02	0.10366354E-02	0.10428480E-02	0.10469586E-02	0.10499472E-02
42.00	0.10025042E-05	0.10388826E-02	0.10506243E-02	0.10567647E-02	0.10608283E-02	0.10637823E-02
43.00	0.10011599E-05	0.10525454E-02	0.10641548E-02	0.10702270E-02	0.10742457E-02	0.10771672E-02
44.00	0.99994122E-06	0.10657860E-02	0.10772699E-02	0.10832772E-02	0.10872934E-02	0.10901445E-02
45.00	0.99883346E-06	0.10786359E-02	0.10900006E-02	0.10959466E-02	0.10998824E-02	0.11027441E-02
46.00	0.99781937E-06	0.10911319E-02	0.11023830E-02	0.11082704E-02	0.11121677E-02	0.11150015E-02
47.00	0.99688714E-06	0.11033020E-02	0.11144448E-02	0.11202761E-02	0.11241366E-02	0.11269441E-02
48.00	0.99602676E-06	0.11151710E-02	0.11262100E-02	0.11319877E-02	0.11358131E-02	0.11385952E-02
49.00	0.99522822E-06	0.11267613E-02	0.11377009E-02	0.11434273E-02	0.11472190E-02	0.11499764E-02
50.00	0.99448425E-06	0.11380518E-02	0.11489359E-02	0.11546130E-02	0.11583720E-02	0.11611062E-02

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

DROPLET RADII(CM) TIME HISTORY

TIME(SEC)	R(7)	R(8)	R(9)	R(10)	R(11)	R(12)
1.00	0.31638026E-05	0.33015494E-05	0.34142404E-05	0.35237490E-05	0.36320853E-05	0.37407326E-05
2.00	0.32512426E-05	0.33728793E-05	0.34853410E-05	0.36025585E-05	0.37146037E-05	0.38270100E-05
3.00	0.33259339E-05	0.34526217E-05	0.35728071E-05	0.36902838E-05	0.38065946E-05	0.39233310E-05
4.00	0.34095056E-05	0.35467647E-05	0.36665870E-05	0.37890341E-05	0.39103381E-05	0.40321465E-05
5.00	0.35041176E-05	0.36414967E-05	0.37732952E-05	0.39016595E-05	0.40289151E-05	0.41567955E-05
6.00	0.36127940E-05	0.37575819E-05	0.38966436E-05	0.40322229E-05	0.41667645E-05	0.43020966E-05
7.00	0.37399899E-05	0.38946179E-05	0.40421883E-05	0.41868607E-05	0.43306272E-05	0.44754352E-05
8.00	0.38926109E-05	0.40586629E-05	0.42187648E-05	0.43754289E-05	0.45314437E-05	0.46889163E-05
9.00	0.40823270E-05	0.42649808E-05	0.44417475E-05	0.46153418E-05	0.47888301E-05	0.49645569E-05
10.00	0.43311265E-05	0.45350670E-05	0.47415797E-05	0.49418832E-05	0.51434445E-05	0.53490467E-05
11.00	0.46694165E-05	0.49431073E-05	0.51944344E-05	0.54472621E-05	0.57063680E-05	0.59759204E-05
12.00	0.53272561E-05	0.57115267E-05	0.61212077E-05	0.65716476E-05	0.70866463E-05	0.77002591E-05
13.00	0.95153127E-05	0.14855666E-04	0.22174514E-04	0.29845833E-04	0.37137579E-04	0.43907115E-04
14.00	0.82768665E-04	0.92748567E-04	0.10099421E-03	0.10803081E-03	0.11419451E-03	0.11972067E-03
15.00	0.12832487E-03	0.13685162E-03	0.14727559E-03	0.15827364E-03	0.16876258E-03	0.17920092E-03
16.00	0.23622962E-03	0.24251676E-03	0.24775369E-03	0.25228970E-03	0.25631301E-03	0.25998007E-03
17.00	0.30377880E-03	0.30908245E-03	0.31356071E-03	0.31745178E-03	0.32091304E-03	0.32405788E-03
18.00	0.36664796E-03	0.37130411E-03	0.37524500E-03	0.37867622E-03	0.38173376E-03	0.38451608E-03
19.00	0.42533339E-03	0.42651270E-03	0.43305545E-03	0.43614418E-03	0.43889973E-03	0.44140988E-03
20.00	0.48008119E-03	0.48385495E-03	0.48713153E-03	0.48995600E-03	0.49247779E-03	0.49477676E-03
21.00	0.53106272E-03	0.53458801E-03	0.53758221E-03	0.54019690E-03	0.54253289E-03	0.54466352E-03
22.00	0.57863464E-03	0.58172783E-03	0.58452692E-03	0.58697257E-03	0.58915839E-03	0.59115305E-03
23.00	0.62235631E-03	0.62546064E-03	0.62810024E-03	0.63040759E-03	0.63247071E-03	0.63435361E-03
24.00	0.66301609E-03	0.66596619E-03	0.66847377E-03	0.67066634E-03	0.67262701E-03	0.67441724E-03
25.00	0.70006164E-03	0.70344820E-03	0.70584496E-03	0.70794090E-03	0.70981565E-03	0.71152789E-03
26.00	0.73561771E-03	0.73812297E-03	0.74042520E-03	0.74243918E-03	0.74424106E-03	0.74588670E-03
27.00	0.76764422E-03	0.77021401E-03	0.77243545E-03	0.77437889E-03	0.77611813E-03	0.77770650E-03
28.00	0.79741911E-03	0.79994602E-03	0.80209761E-03	0.80398005E-03	0.80566481E-03	0.80720405E-03
29.00	0.82930544E-03	0.82754041E-03	0.82963076E-03	0.83146011E-03	0.83309738E-03	0.83459332E-03
30.00	0.85081649E-03	0.85320813E-03	0.85524470E-03	0.85702701E-03	0.85862200E-03	0.86008036E-03
31.00	0.87481248E-03	0.87714777E-03	0.87913661E-03	0.88087725E-03	0.88243559E-03	0.88385958E-03
32.00	0.89725629E-03	0.89954329E-03	0.90148932E-03	0.90319314E-03	0.90471818E-03	0.90611191E-03
33.00	0.91832364E-03	0.92056324E-03	0.92247105E-03	0.92414138E-03	0.92563662E-03	0.92700310E-03
34.00	0.93816314E-03	0.94036176E-03	0.94223488E-03	0.94387471E-03	0.94536298E-03	0.94668431E-03
35.00	0.95691439E-03	0.95907575E-03	0.96091721E-03	0.96252933E-03	0.96397265E-03	0.96529187E-03
36.00	0.97469566E-03	0.97682280E-03	0.97863493E-03	0.98022167E-03	0.98164240E-03	0.98294113E-03
37.00	0.99161454E-03	0.99371001E-03	0.99549536E-03	0.99705858E-03	0.99845836E-03	0.99973800E-03
38.00	0.10077662E-02	0.10098324E-02	0.10113928E-02	0.10131344E-02	0.10145148E-02	0.10157768E-02
39.00	0.10232320E-02	0.10252707E-02	0.10270081E-02	0.10285294E-02	0.10298919E-02	0.10311371E-02
40.00	0.10386843E-02	0.10400976E-02	0.10418133E-02	0.10433197E-02	0.10446610E-02	0.10458911E-02
41.00	0.10523889E-02	0.10543785E-02	0.10560737E-02	0.10575582E-02	0.10588877E-02	0.10601031E-02
42.00	0.10661965E-02	0.10681632E-02	0.10698391E-02	0.10713071E-02	0.10726217E-02	0.10738233E-02
43.00	0.10795949E-02	0.10815004E-02	0.10831582E-02	0.10846101E-02	0.10859105E-02	0.10870993E-02
44.00	0.10925073E-02	0.10944323E-02	0.10960728E-02	0.10975096E-02	0.10987967E-02	0.10999732E-02
45.00	0.11050832E-02	0.11068889E-02	0.11084131E-02	0.11100357E-02	0.11113097E-02	0.11124746E-02
46.00	0.11171731E-02	0.11192053E-02	0.11208139E-02	0.11222227E-02	0.11234847E-02	0.11246386E-02
47.00	0.11292386E-02	0.11311085E-02	0.11327022E-02	0.11340980E-02	0.11353481E-02	0.11364913E-02
48.00	0.11408690E-02	0.11427219E-02	0.11443014E-02	0.11456846E-02	0.11469238E-02	0.11480565E-02
49.00	0.11522304E-02	0.11540672E-02	0.11556330E-02	0.11570042E-02	0.11582326E-02	0.11593555E-02
50.00	0.11633411E-02	0.11651623E-02	0.11667148E-02	0.11680746E-02	0.11692925E-02	0.11704061E-02

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

DROPLET RADIICHI TIME HISTORY

TIME(SEC)	R(13)	R(14)	R(15)	R(16)	R(17)	R(18)
1.00	0.38511971E-05	0.39655524E-05	0.40857931E-05	0.42147685E-05	0.43573409E-05	0.45211564E-05
2.00	0.39413335E-05	0.40597224E-05	0.41842450E-05	0.43178570E-05	0.44696053E-05	0.46354289E-05
3.00	0.40421073E-05	0.41651583E-05	0.42946349E-05	0.44336202E-05	0.45873758E-05	0.47641861E-05
4.00	0.41561507E-05	0.42846832E-05	0.44199987E-05	0.45653287E-05	0.47261910E-05	0.49112814E-05
5.00	0.42870679E-05	0.44221906E-05	0.45645411E-05	0.47175326E-05	0.48870000E-05	0.50821473E-05
6.00	0.44402899E-05	0.45833522E-05	0.47344211E-05	0.48969414E-05	0.50771459E-05	0.52848834E-05
7.00	0.46232899E-05	0.47765981E-05	0.49353038E-05	0.51141596E-05	0.53083331E-05	0.55325436E-05
8.00	0.48500342E-05	0.50178824E-05	0.51935012E-05	0.53872836E-05	0.56007866E-05	0.58479263E-05
9.00	0.51449933E-05	0.53336544E-05	0.55340588E-05	0.57513189E-05	0.59942258E-05	0.62768413E-05
10.00	0.55617020E-05	0.57857969E-05	0.60257129E-05	0.62881772E-05	0.65845818E-05	0.69333948E-05
11.00	0.62607787E-05	0.65681761E-05	0.69004417E-05	0.72882503E-05	0.77358573E-05	0.82877195E-05
12.00	0.89602291E-05	0.94712977E-05	0.10838995E-04	0.12722096E-04	0.19292229E-04	0.18748338E-04
13.00	0.50214454E-04	0.56163219E-04	0.61777115E-04	0.67124245E-04	0.72354056E-04	0.77691817E-04
14.00	0.12783378E-03	0.12951727E-03	0.13356828E-03	0.13820991E-03	0.14235511E-03	0.14660091E-03
15.00	0.19604623E-03	0.19584506E-03	0.20343337E-03	0.20686531E-03	0.21024115E-03	0.21371018E-03
16.00	0.26333402E-03	0.26651612E-03	0.26993267E-03	0.27242582E-03	0.27527940E-03	0.27821958E-03
17.00	0.32697362E-03	0.32972917E-03	0.33234619E-03	0.33486052E-03	0.33734436E-03	0.33990783E-03
18.00	0.38709957E-03	0.38954383E-03	0.39176818E-03	0.39410382E-03	0.39631478E-03	0.39859908E-03
19.00	0.44374261E-03	0.44595171E-03	0.44805417E-03	0.45007770E-03	0.45208074E-03	0.45415130E-03
20.00	0.49691438E-03	0.49894024E-03	0.50086924E-03	0.50272699E-03	0.50456682E-03	0.50646975E-03
21.00	0.54664584E-03	0.54852529E-03	0.55031548E-03	0.55204052E-03	0.55374927E-03	0.55551762E-03
22.00	0.59300940E-03	0.59476984E-03	0.59644761E-03	0.59806439E-03	0.59966673E-03	0.60132562E-03
23.00	0.63610659E-03	0.63776970E-03	0.63935458E-03	0.64088264E-03	0.64239744E-03	0.64396556E-03
24.00	0.67638431E-03	0.67786810E-03	0.67947397E-03	0.68062800E-03	0.68206945E-03	0.68356213E-03
25.00	0.71312231E-03	0.71463571E-03	0.71607856E-03	0.71746996E-03	0.71884971E-03	0.72027859E-03
26.00	0.74741966E-03	0.74887462E-03	0.75026206E-03	0.75160014E-03	0.75292704E-03	0.75430167E-03
27.00	0.77916661E-03	0.78055128E-03	0.78193122E-03	0.78322343E-03	0.78450516E-03	0.78583299E-03
28.00	0.80863605E-03	0.80999942E-03	0.81129768E-03	0.81255031E-03	0.81379269E-03	0.81507578E-03
29.00	0.83598704E-03	0.83731045E-03	0.83857263E-03	0.83979033E-03	0.84099825E-03	0.84224995E-03
30.00	0.86153869E-03	0.86272857E-03	0.86395885E-03	0.86514605E-03	0.86632348E-03	0.86754374E-03
31.00	0.88516872E-03	0.88644680E-03	0.88764867E-03	0.88880863E-03	0.88995905E-03	0.89115137E-03
32.00	0.90741087E-03	0.90886440E-03	0.90982090E-03	0.91095641E-03	0.91208285E-03	0.91329003E-03
33.00	0.92627668E-03	0.92548601E-03	0.93063992E-03	0.93175331E-03	0.93285786E-03	0.93400269E-03
34.00	0.94793527E-03	0.94912294E-03	0.95025613E-03	0.95134950E-03	0.95243449E-03	0.95359883E-03
35.00	0.96652108E-03	0.96768932E-03	0.96880365E-03	0.96987886E-03	0.97094569E-03	0.97205141E-03
36.00	0.98415138E-03	0.98530110E-03	0.98639796E-03	0.98743641E-03	0.98850671E-03	0.98959943E-03
37.00	0.10009506E-02	0.10020635E-02	0.10031443E-02	0.10041874E-02	0.10052223E-02	0.10062952E-02
38.00	0.10189530E-02	0.10180702E-02	0.10191360E-02	0.10201649E-02	0.10211857E-02	0.10222439E-02
39.00	0.10322908E-02	0.10334007E-02	0.10344528E-02	0.10354682E-02	0.10364759E-02	0.10375204E-02
40.00	0.10470375E-02	0.10481265E-02	0.10491658E-02	0.10501686E-02	0.10511640E-02	0.10521957E-02
41.00	0.10612363E-02	0.10623124E-02	0.10633394E-02	0.10643306E-02	0.10653143E-02	0.10663338E-02
42.00	0.10749435E-02	0.10760077E-02	0.10770233E-02	0.10780036E-02	0.10789761E-02	0.10799842E-02
43.00	0.10882076E-02	0.10892602E-02	0.10902649E-02	0.10912346E-02	0.10921969E-02	0.10931944E-02
44.00	0.11010699E-02	0.11021118E-02	0.11031062E-02	0.11040659E-02	0.11050184E-02	0.11060058E-02
45.00	0.11135605E-02	0.11145922E-02	0.11155766E-02	0.11165270E-02	0.11174706E-02	0.11184474E-02
46.00	0.11257138E-02	0.11267357E-02	0.11277108E-02	0.11286521E-02	0.11295860E-02	0.11305544E-02
47.00	0.11375570E-02	0.11385693E-02	0.11395353E-02	0.11404681E-02	0.11413936E-02	0.11423531E-02
48.00	0.11491126E-02	0.11501161E-02	0.11510735E-02	0.11519978E-02	0.11529192E-02	0.11538661E-02
49.00	0.11604025E-02	0.11613974E-02	0.11623467E-02	0.11632631E-02	0.11641725E-02	0.11651153E-02
50.00	0.11714445E-02	0.11724308E-02	0.11733724E-02	0.11742811E-02	0.11751829E-02	0.11761179E-02

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

DROPLET RADIICHI TIME HISTORY

TIME(SEC)	R(19)	R(20)	R(21)	R(
1.00	0.47209360E-05	0.49996970E-05	0.88590247E-06	
2.00	0.48426191E-05	0.51318639E-05	0.89383451E-06	
3.00	0.49800083E-05	0.52814921E-05	0.90215269E-06	
4.00	0.51373618E-05	0.54534303E-05	0.91089311E-06	
5.00	0.53207223E-05	0.56546251E-05	0.92009708E-06	
6.00	0.55391738E-05	0.58956211E-05	0.92981236E-06	
7.00	0.58075084E-05	0.61938445E-05	0.94009442E-06	
8.00	0.61519659E-05	0.65808226E-05	0.95100825E-06	
9.00	0.66265247E-05	0.71235163E-05	0.96263011E-06	
10.00	0.73711253E-05	0.80052496E-05	0.97505290E-06	
11.00	0.90235972E-05	0.10187720E-04	0.98838245E-06	
12.00	0.23426153E-04	0.30224255E-04	0.10026833E-05	
13.00	0.83520616E-04	0.90717629E-04	0.10176791E-05	
14.00	0.15125373E-03	0.15702701E-03	0.10326412E-05	
15.00	0.21752877E-03	0.22229114E-03	0.10486729E-05	
16.00	0.28146477E-03	0.28552487E-03	0.10589511E-05	
17.00	0.34274231E-03	0.34825554E-03	0.10688318E-05	
18.00	0.40112762E-03	0.40430180E-03	0.10758940E-05	
19.00	0.45644538E-03	0.45932760E-03	0.10799931E-05	
20.00	0.50857919E-03	0.51123113E-03	0.10812728E-05	
21.00	0.55747852E-03	0.55994513E-03	0.10800959E-05	
22.00	0.60316524E-03	0.60548028E-03	0.10769454E-05	
23.00	0.64570550E-03	0.64785574E-03	0.10723734E-05	
24.00	0.68521872E-03	0.68730442E-03	0.10668964E-05	
25.00	0.72186487E-03	0.72382209E-03	0.10609438E-05	
26.00	0.75582764E-03	0.75774943E-03	0.10548501E-05	
27.00	0.78733704E-03	0.78918363E-03	0.10488602E-05	
28.00	0.81659889E-03	0.81830914E-03	0.10431386E-05	
29.00	0.84383949E-03	0.84535037E-03	0.10377844E-05	
30.00	0.86863858E-03	0.87046570E-03	0.10328513E-05	
31.00	0.89247525E-03	0.89414371E-03	0.10283597E-05	
32.00	0.91456643E-03	0.91617997E-03	0.10242939E-05	
33.00	0.93527418E-03	0.93687628E-03	0.10206459E-05	
34.00	0.95480750E-03	0.95638121E-03	0.10173817E-05	
35.00	0.97327959E-03	0.97482721E-03	0.10144695E-05	
36.00	0.99080452E-03	0.99232039E-03	0.10118729E-05	
37.00	0.10074868E-02	0.10089886E-02	0.10095591E-05	
38.00	0.10234192E-02	0.10245067E-02	0.10074937E-05	
39.00	0.10386806E-02	0.10401427E-02	0.10056483E-05	
40.00	0.10533417E-02	0.10547861E-02	0.10039930E-05	
41.00	0.10674666E-02	0.10688943E-02	0.10025042E-05	
42.00	0.10811044E-02	0.10825163E-02	0.10011599E-05	
43.00	0.10943024E-02	0.10956994E-02	0.99956122E-06	
44.00	0.11071025E-02	0.11084850E-02	0.99883346E-06	
45.00	0.11195336E-02	0.11209026E-02	0.99781937E-06	
46.00	0.11316303E-02	0.11329863E-02	0.99688714E-06	
47.00	0.11434190E-02	0.11447828E-02	0.99602676E-06	
48.00	0.11549226E-02	0.11562547E-02	0.99522822E-06	
49.00	0.11661628E-02	0.11674834E-02	0.99448425E-06	
50.00	0.11771566E-02	0.11784662E-02	0.11835212E-02	

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

TIME(SEC)	P(MB)	V(CC)	S-1	T(K)
1.00	0.23959322E-05	0.26230882E-05	0.28179902E-05	0.29796711E-05
2.00	0.23998446E-05	0.26759853E-05	0.28774193E-05	0.30446827E-05
3.00	0.24485080E-05	0.27344340E-05	0.29433995E-05	0.31170512E-05
4.00	0.25023846E-05	0.27996157E-05	0.30172596E-05	0.31964737E-05
5.00	0.25626123E-05	0.28731192E-05	0.31010977E-05	0.32912885E-05
6.00	0.26307416E-05	0.29571656E-05	0.31976842E-05	0.33986803E-05
7.00	0.27089682E-05	0.30549927E-05	0.33112010E-05	0.35262947E-05
8.00	0.28005416E-05	0.31715881E-05	0.34482773E-05	0.36818492E-05
9.00	0.29105786E-05	0.33152410E-05	0.36203719E-05	0.38802891E-05
10.00	0.30478750E-05	0.35013773E-05	0.38501548E-05	0.41524145E-05
11.00	0.32296030E-05	0.37643449E-05	0.41939620E-05	0.45830320E-05
12.00	0.34964896E-05	0.42124766E-05	0.48906140E-05	0.56886936E-05
13.00	0.39996389E-05	0.68022391E-05	0.30339377E-04	0.93758180E-04
14.00	0.31853953E-04	0.95297233E-04	0.12391039E-03	0.14145357E-03
15.00	0.13754697E-03	0.18329990E-03	0.20503834E-03	0.21880926E-03
16.00	0.22341793E-03	0.25968254E-03	0.27754973E-03	0.28901873E-03
17.00	0.29785675E-03	0.32845698E-03	0.34381310E-03	0.35379729E-03
18.00	0.36453130E-03	0.39134617E-03	0.40494697E-03	0.41360222E-03
19.00	0.42517018E-03	0.44924719E-03	0.46154601E-03	0.46958285E-03
20.00	0.48068422E-03	0.50268206E-03	0.51397597E-03	0.52137510E-03
21.00	0.53162733E-03	0.55200397E-03	0.56250347E-03	0.56939549E-03
22.00	0.57841628E-03	0.59750141E-03	0.60736178E-03	0.61384402E-03
23.00	0.62142522E-03	0.63945535E-03	0.64879633E-03	0.65494096E-03
24.00	0.66099223E-03	0.67815557E-03	0.68705622E-03	0.69291894E-03
25.00	0.69742464E-03	0.71385689E-03	0.72238944E-03	0.72801393E-03
26.00	0.73101372E-03	0.74682501E-03	0.75504393E-03	0.76046470E-03
27.00	0.76203654E-03	0.77731418E-03	0.78526279E-03	0.79050777E-03
28.00	0.79075317E-03	0.80556795E-03	0.81328140E-03	0.81837340E-03
29.00	0.81740529E-03	0.83181472E-03	0.83932187E-03	0.84427954E-03
30.00	0.84221549E-03	0.85626706E-03	0.86359191E-03	0.86843054E-03
31.00	0.86538726E-03	0.87912031E-03	0.88628265E-03	0.89101517E-03
32.00	0.88710408E-03	0.90055168E-03	0.90756780E-03	0.91220485E-03
33.00	0.90753287E-03	0.92072269E-03	0.92760660E-03	0.93215727E-03
34.00	0.92682079E-03	0.93977572E-03	0.94653945E-03	0.95101143E-03
35.00	0.94509334E-03	0.95783337E-03	0.96468720E-03	0.96888701E-03
36.00	0.96246437E-03	0.97500696E-03	0.98155928E-03	0.98589272E-03
37.00	0.97903493E-03	0.99139474E-03	0.99785300E-03	0.10021250E-02
38.00	0.99489023E-03	0.10070801E-02	0.10134510E-02	0.10176657E-02
39.00	0.10101069E-02	0.10221377E-02	0.10284272E-02	0.10325881E-02
40.00	0.10247533E-02	0.10366354E-02	0.10428480E-02	0.10469384E-02
41.00	0.10388826E-02	0.10506243E-02	0.10567647E-02	0.10608283E-02
42.00	0.10525454E-02	0.10641548E-02	0.10702270E-02	0.10742457E-02
43.00	0.10658860E-02	0.10772699E-02	0.10832772E-02	0.10872536E-02
44.00	0.10788355E-02	0.10900006E-02	0.10959466E-02	0.10998424E-02
45.00	0.10911319E-02	0.11023830E-02	0.11082704E-02	0.11121677E-02
46.00	0.11033020E-02	0.11144448E-02	0.11202761E-02	0.11241300E-02
47.00	0.11151710E-02	0.11262100E-02	0.11319877E-02	0.11358131E-02
48.00	0.11267613E-02	0.11377009E-02	0.11434273E-02	0.11472190E-02
49.00	0.11380918E-02	0.11489359E-02	0.11546130E-02	0.11583720E-02
50.00	0.96649976E 03	0.10283298E 01	0.10294177E-01	0.29857588E 03

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

TIME(SEC)	WEIGH.PCLE)	WEIGH.MOLE)	WEIGH.MOLE)	MIXING RATIO
1.00	0.31217109E-05	0.32512426E-05	0.33728793E-05	0.34894910E-05
2.00	0.31917289E-05	0.33255339E-05	0.34520217E-05	0.35728071E-05
3.00	0.32699063E-05	0.34095056E-05	0.35407647E-05	0.36665870E-05
4.00	0.33581427E-05	0.35041176E-05	0.36414967E-05	0.37732952E-05
5.00	0.34591349E-05	0.36127940E-05	0.37575819E-05	0.38966936E-05
6.00	0.35767907E-05	0.37395859E-05	0.38940179E-05	0.40427883E-05
7.00	0.37171158E-05	0.38926109E-05	0.40586629E-05	0.42187648E-05
8.00	0.38900425E-05	0.40823270E-05	0.42649808E-05	0.44617675E-05
9.00	0.41138283E-05	0.43311265E-05	0.45390070E-05	0.47415797E-05
10.00	0.44284507E-05	0.46894165E-05	0.49431073E-05	0.51964344E-05
11.00	0.49556566E-05	0.53272561E-05	0.57115267E-05	0.61212077E-05
12.00	0.69126263E-05	0.95153127E-05	0.14855666E-04	0.22174514E-04
13.00	0.70044392E-04	0.82768645E-04	0.92748567E-04	0.10099421E-03
14.00	0.15362485E-03	0.16324807E-03	0.17089162E-03	0.17727559E-03
15.00	0.22851957E-03	0.23628962E-03	0.24251676E-03	0.24775384E-03
16.00	0.29719411E-03	0.30377880E-03	0.30908245E-03	0.31356071E-03
17.00	0.36088470E-03	0.36664796E-03	0.37130411E-03	0.37524900E-03
18.00	0.42017084E-03	0.42533339E-03	0.42951270E-03	0.43305545E-03
19.00	0.47537638E-03	0.48008119E-03	0.48389495E-03	0.48713193E-03
20.00	0.52671833E-03	0.53106272E-03	0.53458801E-03	0.53758221E-03
21.00	0.57437876E-03	0.57843444E-03	0.58172783E-03	0.58452692E-03
22.00	0.61853533E-03	0.62235631E-03	0.62546064E-03	0.62810324E-03
23.00	0.65939152E-03	0.66301809E-03	0.66596619E-03	0.66847377E-03
24.00	0.69716782E-03	0.70063164E-03	0.70344820E-03	0.70584496E-03
25.00	0.73209195E-03	0.73541771E-03	0.73812297E-03	0.74042520E-03
26.00	0.76439651E-03	0.76760422E-03	0.77021401E-03	0.77243545E-03
27.00	0.79431362E-03	0.79741911E-03	0.79994602E-03	0.80209761E-03
28.00	0.82206712E-03	0.82506546E-03	0.82754041E-03	0.82963076E-03
29.00	0.84787963E-03	0.85081649E-03	0.85320813E-03	0.85524470E-03
30.00	0.87194401E-03	0.87481248E-03	0.87714777E-03	0.87913661E-03
31.00	0.89445198E-03	0.89725829E-03	0.89954329E-03	0.90148952E-03
32.00	0.91555729E-03	0.91832364E-03	0.92056324E-03	0.92247105E-03
33.00	0.93546322E-03	0.93816314E-03	0.94036176E-03	0.94223488E-03
34.00	0.95426058E-03	0.95691439E-03	0.95907575E-03	0.96091721E-03
35.00	0.97208406E-03	0.97469566E-03	0.97682280E-03	0.97863493E-03
36.00	0.98904176E-03	0.99161454E-03	0.99371001E-03	0.99549536E-03
37.00	0.10052298E-02	0.10077662E-02	0.10098324E-02	0.10115926E-02
38.00	0.10207291E-02	0.10232320E-02	0.10252707E-02	0.10270081E-02
39.00	0.10356128E-02	0.10380843E-02	0.10400976E-02	0.10418133E-02
40.00	0.10499672E-02	0.10523889E-02	0.10543785E-02	0.10560737E-02
41.00	0.10637823E-02	0.10661965E-02	0.10681632E-02	0.10698391E-02
42.00	0.10771672E-02	0.10795969E-02	0.10815904E-02	0.10831982E-02
43.00	0.10901445E-02	0.10925073E-02	0.10944323E-02	0.10960726E-02
44.00	0.11027461E-02	0.11051632E-02	0.11069889E-02	0.11086131E-02
45.00	0.11150015E-02	0.11173179E-02	0.11192053E-02	0.11208139E-02
46.00	0.11269441E-02	0.11292386E-02	0.11311085E-02	0.11327022E-02
47.00	0.11385952E-02	0.11408690E-02	0.11427219E-02	0.11443014E-02
48.00	0.11499764E-02	0.11522304E-02	0.11540672E-02	0.11556330E-02
49.00	0.11611062E-02	0.11633411E-02	0.11651623E-02	0.11667148E-02
50.00	0.35225028E-01	0.13608460E-03	0.40035768E-04	0.95437642E-03

Figure 3-18b. Sample Output of the Adiabatic Expansion Simulation for the Case of Gaussian Distribution Function in Example 6 (Cont.)

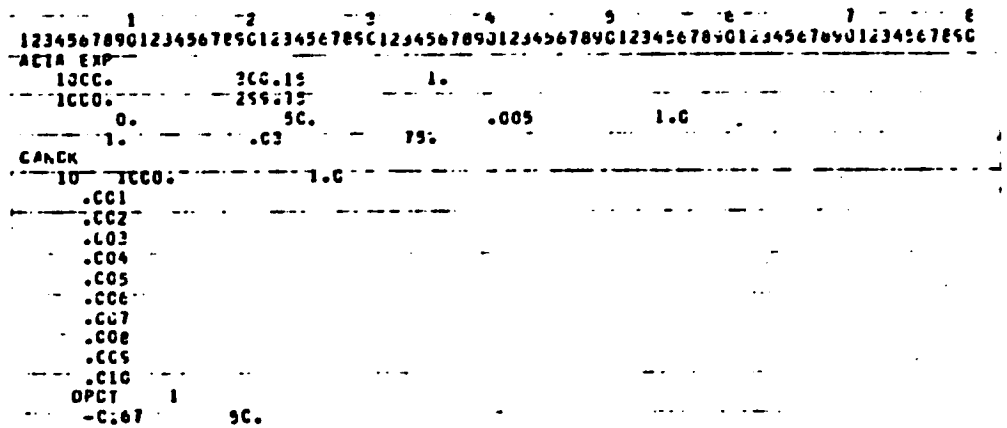


Figure 3-18c. Card Images for Card K Distribution Function in Example 7

INPUT PARAMETERS FOR ADIABATIC EXPANSION EXPERIMENT

INITIAL PRESSURE	0.10000 04 MB
INITIAL TEMPERATURE	0.30020 03 DEG K
INITIAL VOLUME	0.10000 01 CC
SATURATOR PRESSURE	0.10000 04 MB
SATURATOR TEMPERATURE	0.29580 03 DEG K
START TIME	0.0 SEC
END TIME	0.50000 02 SEC
INTEGRATION TIME INCREMENT	0.50000-02 SEC
PRINT TIME INCREMENT	0.10000 01 SEC
THERMAL CONDUCTIVITY COEFF.	0.10000 01
CONDENSATION COEFFICIENT	0.30000-01
SURFACE TENSION	0.75000 02

PRESSURE OPTION: DP/DT VS TIME

DP/DT (MB)	TIME (SEC)
-0.67000 00	0.50000 02

DISTRIBUTION OPTION: C AND K

C	0.10000 04
K	0.10000 01

NUMBER OF PARTICLE CLASSES 10

CLASS	NO. PARTICLES	CRITICAL SIGMA (SUPERSATURATION)
1	0.10000 03	0.10000E-02
2	0.10000 03	0.20000E-02
3	0.10000 03	0.30000E-02
4	0.10000 03	0.40000E-02
5	0.10000 03	0.50000E-02
6	0.10000 03	0.60000E-02
7	0.10000 03	0.70000E-02
8	0.10000 03	0.80000E-02
9	0.10000 03	0.90000E-02
10	0.10000 03	0.10000E-01

CLASS	INIT. RAD.(CM)	CRIT SATUR	CRIT. RAD.(CM)
1	0.18635679D-04	0.95776052E 00	0.32277543E-04
2	0.11268753D-04	0.99922306E 00	0.19518122E-04
3	0.83218623D-05	0.10005328E 01	0.14412802E-04
4	0.66785259D-05	0.10017652E 01	0.11567553E-04
5	0.56121306D-05	0.10025948E 01	0.97222278E-05
6	0.48593412D-05	0.10041016E 01	0.84166262E-05
7	0.42954254D-05	0.10052257E 01	0.74383871E-05
8	0.38538133D-05	0.10063356E 01	0.66755005E-05
9	0.34959278D-05	0.10074324E 01	0.60560527E-05
10	0.32072876D-05	0.10085158E 01	0.55551856E-05

Figure 3-18d. Sample Output of the Adiabatic Expansion Simulation for the Case of C and K Distribution Function in Example 7

TIME(SEC)	PARTICLE TYPE HISTORY					
	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.19261322E-04	0.11017799E-04	0.89814784E-05	0.68928617E-05	0.51380811E-05	0.49780019E-05
2.00	0.20009420E-04	0.12024415E-04	0.88372371E-05	0.70635358E-05	0.59169734E-05	0.51073503E-05
3.00	0.20189284E-04	0.12500150E-04	0.91586908E-05	0.72557E18E-05	0.61CCEE95E-05	0.92586C99E-05
4.00	0.21951166E-04	0.13C7CC76E-04	0.95343616E-05	0.75155223E-05	0.63131288E-05	0.54267457E-05
5.00	0.23300C701E-04	0.13771732E-04	0.99518358E-05	0.79C4564E5E-05	0.65E32E48E-05	0.56262734E-05
6.00	0.25C7C782E-04	0.14674951E-04	0.10567723E-04	0.83118721E-05	0.6E7CEE78E-05	0.586548C5E-05
7.00	0.27387E58E-04	0.159C9929E-04	0.11330249[E-04	0.88826141EE-05	0.7295E8E7E-05	0.61011E99E-05
8.00	0.31458738E-04	0.17774CC0E-04	0.12427344E-04	0.9555557[E-05	0.776513[4EE-05	0.65444710E-05
9.00	0.38486868E1E-04	0.11136773E-04	0.14286E85[E-04	0.10EE7834EE-04	0.822195281E-05	0.708068911E-05
10.00	0.527E4279E-04	0.263875[1E-04	0.18573E43E-04	0.12517E5EE-04	0.5E6522C8E-05	0.764741C3E-05
11.00	0.79B4C42E0E-04	0.32350679E-04	0.39019479E-04	0.22181E8EEE-04	0.14172C44E-04	0.10023426E-04
12.00	0.11941527E-03	0.53595256E-04	0.76042183E-04	0.6CCE3C6EE-04	0.443424C7E-04	0.28394716E-04
13.00	0.1E285E75E-03	0.14342918E-03	0.12834831E-03	0.11462EC0E-03	0.1CC7E475E-03	0.85481937E-04
14.00	0.21311329E-03	0.19352429E-03	0.18C579C4E-03	0.16E53476E-03	0.15731367E-03	0.14459658E-03
15.00	0.2599EC76E-03	0.23847776E-03	0.22703156E-03	0.21E11944E-03	0.2CE7C217E-03	0.19572873E-03
16.00	0.25187575E-03	0.27580662E-03	0.26536779E-03	0.25EC5EC1E-03	0.24695764E-03	0.23709366E-03
17.00	0.32CC9471E-03	0.3C5482B6E-03	0.29569981E-03	0.287C5557E-03	0.27E2E13EE-03	0.26542068E-03
18.00	0.34315214E-03	0.32878411E-03	0.31548958E-03	0.31127761E-03	0.303222[0E-03	0.29457C58E-03
19.00	0.3E1338E8E-03	0.34742942E-03	0.33847499E-03	0.33C573EEE-03	0.3222E331E-03	0.31453115E-03
20.00	0.376342E0E-03	0.36281487E-03	0.354119588E-03	0.346455C2E-03	0.33855276E-03	0.33091428E-03
21.00	0.3E52CCE4E-03	0.37597981E-03	0.367492441E-03	0.3EEC1E54E-03	0.3527C53EE-03	0.34487667E-03
22.00	0.4CC5E32EE-03	0.38762041E-03	0.37630720E-03	0.37155CC3E-03	0.364E3724E-03	0.35718339E-03
23.00	0.41C52373E-03	0.39818484E-03	0.390022781E-03	0.3828422CE4-03	0.37E22E84E-03	0.36832341E-03
24.00	0.42C454[0E-03	0.4C795491E-03	0.39592691E-03	0.39266E1EE-03	0.3855714C7E-03	0.37860381E-03
25.00	0.42547335E-03	0.41711377E-03	0.4C9207C7E-03	0.4022E5C1E-03	0.3953735EE-03	0.38822321E-03
26.00	0.43797C74E-03	0.4257767CE-03	0.417981C6E-03	0.411332[2E-03	0.4C444778E-03	0.397306E7E-03
27.00	0.44E0E353E-03	0.4340222E3E-03	0.426325441E-03	0.41557252E-03	0.4125EC75E-03	0.4C594C69E-03
28.00	0.4538CE11E-03	0.4419C530E-03	0.434311341E-03	0.427E4C14E-03	0.421134C6E-03	0.41418732E-03
29.00	0.4612459[9E-03	0.44967532E-03	0.441957C54E-03	0.43E37555CE-03	0.4285[221E-03	0.422C9355E-03
30.00	0.46E4C752E-03	0.45676652E-03	0.44534149E-03	0.442E2E15E-03	0.43647434E-03	0.42969617E-03
31.00	0.47[321[0E-03	0.46379534E-03	0.45E452E0E-03	0.45CCCCEEE-03	0.44[2E67EE-03	0.43702921E-03
32.00	0.4E201C89E-03	0.47055586E-03	0.463321E3E-03	0.456545552E-03	0.45C7345EE-03	0.4441C559E-03
33.00	0.4EE55313E-03	0.477188C3E-03	0.46998E35E-03	0.4636[19EE-03	0.45791555E-03	0.45C55920E-03
34.00	0.495478514E-03	0.48358066E-03	0.476446241E-03	0.47C151545E-03	0.464C556E5E-03	0.45760372E-03
35.00	0.5CC5C114E-03	0.48575302E-03	0.48272219E-03	0.47E22[11E-03	0.4704E5[3E-03	0.464C5545E-03
36.00	0.5C6853[2E-03	0.495837[4E-03	0.488827[47E-03	0.482E85[7E-03	0.47670375E-03	0.47C32838E-03
37.00	0.512E5415E-03	0.5C172559E-03	0.494773971E-03	0.48EE82E1E-03	0.4E27[432E-03	0.47643483E-03
38.00	0.51E31221E-03	0.507467B9E-03	0.500571[1E-03	0.49453[E2E-03	0.48EE51E8E-03	0.48238558E-03
39.00	0.523836E2E-03	0.513073[6E-03	0.5CE230E6E-03	0.50C23E2CE-03	0.4944C2E1E-03	0.488191B4E-03
40.00	0.52523569E-03	0.51854993E-03	0.51175896E-03	0.505E127CE-03	0.5CCC25E5E-03	0.493861C4E-03
41.00	0.5345167BE-03	0.5239C574E-03	0.517164381E-03	0.5112E233E-03	0.5025315CE-03	0.49940171E-03
42.00	0.53568630E-03	0.52914722E-03	0.522453571E-03	0.51E554[5E-03	0.51C85[3CE-03	0.50482154E-03
43.00	0.5447455CE-03	0.53428CE7E-03	0.527832B9E-03	0.52121[43E-03	0.51E15434E-03	0.51C12E59E-03
44.00	0.54571338E-03	0.53931144E-03	0.532708[3E-03	0.526525[1E-03	0.5213CE51E-03	0.51532337E-03
45.00	0.5534521CE-03	0.544249[2E-03	0.537BE4E3E-03	0.5315444[E-03	0.52E3E140E-03	0.520417C0E-03
46.00	0.55536C25E-03	0.5496E614E-03	0.542567[4E-03	0.53E6[611E-03	0.53131167E-03	0.52541308E-03
47.00	0.5E4022C2E-03	0.55383914E-03	0.54736CE3E-03	0.5416522C1E-03	0.5361E22CE-03	0.53031580E-03
48.00	0.56E66161E-03	0.55E5C786E-03	0.552C6846E-03	0.546436C4E-03	0.54C55518E-03	0.53513CC4E-03
49.00	0.5721529CE-03	0.5630584[E-03	0.55B0[94[1E-03	0.551[C9C1EE-03	0.5426E2E2E-03	0.53985[92E-03
50.00	0.57764687E-03	0.56760820E-03	0.561243[9E-03	0.555677[7E-03	0.55C26E36E-03	0.54450822E-03

Figure 3-18d. Sample Output of the Adiabatic Expansion Simulation for the Case of C and K Distribution Function in Example 7 (Cont.)

TIME(SEC)	A(7)	A(8)	CHARGED PARTICLE(P) TYPE HISTORY A(9)	A(10)
1.00	0.43525247E-05	0.39379618E-05	0.35719140E-05	0.32116259E-05
2.00	0.49520011EC5	0.40307399E-05	0.36223679E-05	0.33413945E-05
3.00	0.46259408E-05	0.41356866E-05	0.37420354E-05	0.34163772E-05
4.00	0.47868142E-05	0.42532884E-05	0.38430135E-05	0.35067843E-05
5.00	0.45288738E-05	0.43891059E-05	0.39582237E-05	0.36059111E-05
6.00	0.51218085E-05	0.45483403E-05	0.40952066E-05	0.37220772E-05
7.00	0.53365182E-05	0.47394187E-05	0.42507854E-05	0.38540135E-05
8.00	0.56537947E-05	0.49767756E-05	0.44447261E-05	0.40132481E-05
9.00	0.60543780E-05	0.52871283E-05	0.46921232E-05	0.42113265E-05
10.00	0.65536470E-05	0.57288744E-05	0.50298058E-05	0.44837611E-05
11.00	0.70823C232E-05	0.64752348E-05	0.55503697E-05	0.48866834E-05
12.00	0.14572567E-04	0.87573C80E-05	0.66294887E-05	0.55245525E-05
13.00	0.E76C8751E-04	0.46153189E-04	0.21886938E-04	0.77165616E-05
14.00	0.12566E33EE-03	0.112C80E7E-03	0.89566980E-04	0.57654511E-04
15.00	0.18314405E-03	0.16814552E-03	0.14944781E-03	0.12348C64E-03
16.00	0.22585C44E-03	0.21255277E-03	0.19814268E-03	0.17368843E-03
17.00	0.25503952E-03	0.24681748E-03	0.23182326E-03	0.21147756E-03
18.00	0.2E47E754E-03	0.27329843E-03	0.25918917E-03	0.24C15567E-03
19.00	0.3C513853E-C3	0.29413C76E-03	0.28070668E-03	0.26264366E-03
20.00	0.32162952E-03	0.31119725E-03	0.29825210E-03	0.28CE7315E-03
21.00	0.33EC3678E-03	0.3257CC73E-03	0.313132C7E-03	0.29E287A1E-03
22.00	0.34EE4821E-03	0.33845566E-03	0.32619759E-03	0.3C5751C2E-03
23.00	0.355EE118E-03	0.345981C1E-03	0.33758E84E-03	0.32155E35E-03
24.00	0.37C25572E-03	0.3606CC12E-03	0.34884247E-03	0.33213724E-03
25.00	0.38C053E0E-03	0.37C52599E-03	0.358676A2E-03	0.34356313E-03
26.00	0.3E52E373E-03	0.37YE8741E-03	0.3EE52EC7E-03	0.3523EC11E-03
27.00	0.39E01374E-03	0.38877665E-03	0.37159147E-03	0.3626E85E5E-03
28.00	0.40CC3EE17E-03	0.39729960E-03	0.38623530E-03	0.37152277E-03
29.00	0.41437452E-03	0.4C9385E6E-03	0.39451C80E-03	0.38CC3E12E-03
30.00	0.42207C57E-03	0.4131946C7E-03	0.40245871E-03	0.38E17EE5E-03
31.00	0.4254E719E-03	0.42071613E-03	0.41011162E-03	0.39EC1C23E-03
32.00	0.43EE5152E-03	0.4275785BE-03	0.41749724E-03	0.4035EEE5E-03
33.00	0.4425E335E-03	0.435004C1E-03	0.42463886E-03	0.41CE6711E-03
34.00	0.45C3C23EE-03	0.44181179E-03	0.43195825E-03	0.41755285E-03
35.00	0.45E8245OE-03	0.448418C8E-03	0.43826713E-03	0.42475C2CE-03
36.00	0.4631E511E-03	0.45483839E-03	0.4447886E2E-03	0.43144255E-03
37.00	0.46533582E-03	0.461C8570E-03	0.45112846E-03	0.43751715E-03
38.00	0.4715348A4E-03	0.46717119E-03	0.4573C430E-03	0.4441155E-03
39.00	0.4812125E0E-03	0.47310558E-03	0.46232506E-03	0.45C3557CE-03
40.00	0.48E53E73E-03	0.47889818E-03	0.4652C0031E-03	0.45E3441CE-03
41.00	0.4925336E7E-03	0.48455736E-03	0.47453E89E-03	0.46219141E-03
42.00	0.495E0C3E3E-03	0.49CC51C8E-03	0.48034854E-03	0.4675C224E-03
43.00	0.5C33EC59E-03	0.495505A8E-03	0.48603723E-03	0.47245354E-03
44.00	0.5CE6CE20E-03	0.5CU8CE47E-03	0.49514C45E-03	0.4785E3ECE-03
45.00	0.51374E64E-03	0.5C60C432E-03	0.49667456E-03	0.48432C51E-03
46.00	0.51E7E789E-03	0.5111C5889E-03	0.5C1E3502E-03	0.48557CE7E-03
47.00	0.52273437E-03	0.516C9729E-03	0.50685676E-03	0.49471523E-03
48.00	0.32E39C59E-03	0.52100373E-03	0.51188450E-03	0.49577C15E-03
49.00	0.5333E145E-03	0.525822E3E-03	0.51674340E-03	0.5C473C5CE-03
50.00	0.53E04913E-03	0.53059794E-03	0.52153645E-03	0.5C5EC2C2E-03

Figure 3-18d. Sample Output of the Adiabatic Expansion Simulation for the Case of C and K Distribution Function in Example 7 (Cont.)

TIME(SEC)	P(MB)	V(CC)	S-1	T(K)
1.00	0.999329E3E 03	0.100647[illegible]E 01	-0.20632844E-C1	C.3[illegible]E C3
2.00	[illegible]	[illegible]	[illegible]	[illegible]
3.00	C.997486[illegible]E 03	0.10014410E C1	-0.19355C4CE-C1	C.25551823E C3
4.00	[illegible]	[illegible]	[illegible]	[illegible]
5.00	0.9966465[illegible] 03	0.100240428 01	-0.1C053243E-C1	C.255663[illegible] C3
6.00	[illegible]	[illegible]	[illegible]	[illegible]
7.00	C.995305[illegible]E C3	0.10033703E 01	-0.4112C63EE-C2	C.25514SC2E C3
8.00	[illegible]	[illegible]	[illegible]	[illegible]
9.00	C.993569[illegible]E C3	0.10043383E 01	0.66253CCEE-C3	C.25563428E C3
10.00	[illegible]	[illegible]	[illegible]	[illegible]
11.00	C.992625E8E C3	0.10053101E 01	0.6C3372[illegible]E-C2	C.25552CC2E C3
12.00	[illegible]	[illegible]	[illegible]	[illegible]
13.00	C.991289[illegible]E 03	0.100631[illegible]E 01	0.10634135E-C1	C.25541577E C3
14.00	[illegible]	[illegible]	[illegible]	[illegible]
15.00	0.985949[illegible]E 03	0.10074535E 01	0.11241[illegible]E-C1	C.25536[illegible]E C3
16.00	C.989279[illegible]E 03	0.10080814E 01	0.[illegible]E-C2	C.25531[illegible]E C3
17.00	0.988[illegible]E 03	0.10087175E 01	0.843[illegible]E-C2	0.25532[illegible]E C3
18.00	[illegible]	[illegible]	[illegible]	[illegible]
19.00	0.987265[illegible]E 03	0.100957[illegible]E 01	0.55946[illegible]E-C2	0.25534[illegible]E C3
20.00	[illegible]	[illegible]	[illegible]	[illegible]
21.00	C.985929[illegible]E 03	0.10111895E C1	0.4700[illegible]E-C2	C.25531152E C3
22.00	[illegible]	[illegible]	[illegible]	[illegible]
23.00	C.9845[illegible]E 03	0.10123873E C1	0.4C66[illegible]E-C2	C.25527417E C3
24.00	[illegible]	[illegible]	[illegible]	[illegible]
25.00	C.983245[illegible]E 03	0.10135775E 01	0.37124[illegible]E-C2	C.25522340E C3
26.00	[illegible]	[illegible]	[illegible]	[illegible]
27.00	C.9819C[illegible]E 03	0.10147676E C1	0.34781245E-C2	0.25515C52E C3
28.00	[illegible]	[illegible]	[illegible]	[illegible]
29.00	C.980565[illegible]E 03	0.10159578E C1	0.3255[illegible]E-C2	0.25514771E C3
30.00	[illegible]	[illegible]	[illegible]	[illegible]
31.00	0.97922[illegible]E 03	0.10171479E 01	0.3195[illegible]E-C2	C.25510376E C3
32.00	[illegible]	[illegible]	[illegible]	[illegible]
33.00	0.97788[illegible]E 03	0.10183445E 01	0.303[illegible]E-C2	C.255C[illegible]E C3
34.00	[illegible]	[illegible]	[illegible]	[illegible]
35.00	0.976549ECE C3	0.10195417E 01	0.292[illegible]E-C2	C.25501538E C3
36.00	[illegible]	[illegible]	[illegible]	[illegible]
37.00	C.9752C[illegible]E 03	0.10207415E C1	0.2[illegible]E-C2	C.25[illegible]CE C3
38.00	[illegible]	[illegible]	[illegible]	[illegible]
39.00	0.97386[illegible]E 03	0.10219440E 01	0.2757C72[illegible]E-C2	C.25852578E C3
40.00	[illegible]	[illegible]	[illegible]	[illegible]
41.00	C.972525[illegible]E C3	0.10231485E C1	0.2684E84CE-C2	C.25[illegible]E C3
42.00	[illegible]	[illegible]	[illegible]	[illegible]
43.00	C.97118[illegible]E 03	0.10243555E C1	0.2615E414E-C2	C.25[illegible]E C3
44.00	[illegible]	[illegible]	[illegible]	[illegible]
45.00	0.96584[illegible]E 03	0.10255671E 01	0.256C[illegible]E-C2	0.25[illegible]CC4E C3
46.00	[illegible]	[illegible]	[illegible]	[illegible]
47.00	C.968505[illegible]E 03	0.10267801E 01	0.250[illegible]CE-C2	C.25[illegible]E C3
48.00	[illegible]	[illegible]	[illegible]	[illegible]
49.00	0.96716[illegible]E 03	0.10279970E 01	0.245[illegible]E-C2	C.25[illegible]E C3
50.00	[illegible]	[illegible]	[illegible]	[illegible]

Figure 3-18d. Sample Output of the Adiabatic Expansion Simulation for the Case of C and K Distribution Function in Example 7 (Cont.)

TIME(SEC)	AA(GR/CELL)	AV(GR/CELL)	AG(GM/CELL)	MIXING RATIO
1.00	0.23748571E-12	0.13960707E-05	0.40070555E-04	0.37348329E-08
2.00	0.26501955E-12	0.13960707E-05	0.40070555E-04	0.41651877E-08
3.00	0.30011770E-12	0.13960707E-05	0.40070555E-04	0.47191504E-08
4.00	0.34585563E-12	0.13960707E-05	0.40070555E-04	0.54336442E-08
5.00	0.40595451?E-12	0.13960707E-05	0.40070555E-04	0.64436927E-08
6.00	0.50474857E-12	0.13960707E-05	0.40070555E-04	0.79347362E-08
7.00	0.65814043E-12	0.13960707E-05	0.40070555E-04	0.10351762E-07
8.00	0.95213160E-12	0.13960698E-05	0.40070555E-04	0.14976461E-07
9.00	0.16825230E-11	0.13960685E-05	0.40070555E-04	0.26413831E-07
10.00	0.42935546E-11	0.13960671E-05	0.40070555E-04	0.67535041E-07
11.00	0.16636500E-10	0.13960544E-05	0.40070559E-04	0.26161757E-06
12.00	0.16737257E-10	0.13959543E-05	0.40070592E-04	0.12070577E-05
13.00	0.30713587E-09	0.13957642E-05	0.40070652E-04	0.48315585E-05
14.00	0.90844043E-09	0.13951621E-05	0.40070CC8?E-04	0.14285485E-04
15.00	0.15671C79E-08	0.13941035E-05	0.40068502?E-04	0.2C964744E-04
16.00	0.33369C25E-08	0.13927338E-05	0.40067665E-04	C.52456170E-04
17.00	0.47580117E-08	0.13912795E-05	0.40066195EE-04	C.7545C933E-04
18.00	C.62027645E-08	0.13898680E-05	0.40064755E-04	C.9757324CE-04
19.00	0.75033952E-08	0.13885674E-05	0.40063485E-04	C.11802373SE-03
20.00	C.87012637E-08	0.13873656E-05	0.40062255EE-04	C.13662403E-03
21.00	C.98157?3?1E-08	0.13862505E-05	0.40061177?E-04	0.1544E284E-03
22.00	0.10883454E-07	0.13851877E-05	0.4CC6C111E-04	C.17121949E-03
23.00	C.11911?C3E-07	0.13841591E-05	0.4CC55CECE-04	C.18739E67E-03
24.00	0.12916949E-07	0.13831541E-05	0.4C058C7CE-04	C.2C322014E-03
25.00	C.13908249E-07	0.13821627E-05	0.4C057C8EE-04	C.21881E25E-03
26.CO	C.14890333E-07	0.13811805E-05	0.4C056111E-04	C.23427058E-03
27.00	0.15866239E-07	0.13802C44EE-05	0.4C055?2EE-04	C.24962868E-03
28.00	0.16837813E-07	0.13792333E-05	0.4C054161E-04	C.26451E66E-03
29.00	C.17802E25E-07	0.13782646E-05	0.4C053188EE-04	C.28C12525E-03
30.00	0.18772155E-07	0.13772988E-05	0.4C052222E-04	C.29536174E-03
31.00	C.19736177E-07	0.13763347E-05	0.4C051?2E?E-04	C.31C93461E-03
32.00	0.20695646E-07	0.13753724E-05	0.4C05C25CE-04	C.32564C4E-03
33.00	0.21E5?E84CE-07	0.13744111E-05	0.4C049332CE-04	0.34081214E-03
34.00	0.22615675E-07	0.13734507E-05	0.4C04863?CE-04	C.35592518E-03
35.00	0.2357823?E-07	0.13724921E-05	0.4C047941E-04	0.37102471E-03
36.00	C.24537166E-07	0.13715335E-05	0.4C046463E-04	C.38611301E-03
37.00	0.25499084E-07	0.13705749E-05	0.4C0455C3E-04	0.4C119258E-03
38.CO	C.26459161E-07	0.13696181E-05	C.4C0445421-C4	C.41624440E-03
39.00	0.2741CC99E-07	0.13686613E-05	0.4C043?42E-04	C.4213?01?E-03
40.00	0.28366763E-07	0.13677045E-05	0.4C042636E-04	C.44635106E-03
41.00	C.29323154E-07	0.13667477E-05	0.4C041671EE-04	C.46E144E22E-03
42.00	C.30275331E-07	0.13657918E-05	C.4C04C7115E-04	C.4765C235E-03
43.CO	0.31233349E-07	0.13648360E-05	0.4C03957?2E-04	C.49133482E-03
44.00	C.32191245E-07	0.13638801E-05	0.4CC3E8C5E-04	C.5C66C525E-03
45.00	0.33147071E-07	0.13629242E-05	0.4C03784?E-04	0.5221?219E-03
46.00	0.34102854E-07	0.13619683E-05	0.4C036EE1EE-04	C.5367C513E-03
47.00	C.35C5?1E33E-07	0.13610124E-05	0.4C035942E-04	C.55175931E-03
48.00	C.36014431E-07	0.13600566E-05	0.4C034562E-04	C.5E88C618E-03
49.00	0.3697C278E-07	0.13591007E-05	0.4C033C21E-04	C.5?1E8E49E-03
50.00	0.37926159E-07	0.13581448E-05	0.4C03301?E-04	C.59651211E-03

Figure 3-18d. Sample Output of the Adiabatic Expansion Simulation for the Case of C and K Distribution Function in Example 7 (Cont.)

3.2.2 Non-adiabatic Expansion Module

The Non-adiabatic Expansion Module describes the process of heat and mass transfers and the cloud physics processes taking place in the expansion chamber when the chamber wall temperature is not programmed to follow the gas temperature. In this case, there will generally be both temperature and concentration gradients in the chamber. This model thus subdivides the space in the chamber into a grid of zones or cells, and computes the cloud physics processes taking place in each cell while it is exchanging mass and heat energy with adjacent cells.

The module currently uses a one dimensional array of cells; it approximates the actual chamber geometry (a right heptagonal cylinder of finite length) by either an infinite circular cylinder or a sphere at the option of the user. The grid of cells thus consists of either concentric cylindrical or spherical shells of finite thickness. For most purposes, the expansion chamber geometry will be best approximated by an equivalent sphere, i.e., a sphere whose radius is chosen to give the same time constant for heat conduction or vapor diffusion at its center. For the current ACPL design, this equivalent sphere is 17 or 18 cm in radius.

The treatment of cloud physics processes is the same as in the expansion chamber.

This module will eventually be capable of simulating experiments with any sequence of wall temperature and chamber pressure changes. For the present, it is restricted to a single type of experiment: the wall temperature is held constant at its initial value; the chamber initially undergoes an expansion at constant dP/dt for a specified time, after which the chamber is sealed off, so that the total volume is held constant for the remainder of the experiment.

During the period of holding the total volume constant--the chamber is sealed--the temperature of the wall can be varied. This specific capability--changing the wall temperature--at present can be implemented through the usage of

sub-program function (hard-coded) rather than the normal input. The DTWALL function is temporarily provided to the user for defining the wall temperature profile during the constant volume period.

This module allows multiple expansions of the gas parcel. The initial chamber temperature and pressure are specified and the wall temperature remains constant at the initial temperature. The gas is then expanded one or more times at various dP/dt values (including dP/dt = Ø), or the chamber may be sealed for a given time interval.

The input conditions required to use the Non-adiabatic Expansion Module are:

1. The number of space grid points (NSPACE) used in the module; an index used to define the geometry of the model (KGEOM); and the spacing between grid points (DZ). If the radius of the chamber is Z, the NSPACE is equal to Z/DZ+1. That is, the number of grid points is one greater than the number of space intervals because the grid points are defined to be the end points of the cells. The model structure requires NSPACE to be at least 3, but no larger than 21. The input value of KGEOM is 1 for cylindrical geometry and 2 for spherical geometry.

2. The saturator temperature (TSATUR) in ^{o}K, and pressure (PSATUR) in millibars (mb).

3. The initial chamber temperature (TZERO) in ^{o}K and initial pressure (PZERO) in mb.

4. The number of classes of aerosol particles (NCLASS) and the reference volume (VZERO) used in the specification of initial particle concentrations. If the particle concentrations are to be specified in number per cubic centimeter, VZERO can be left black or input, and the model will automatically set it to unity.

5. The distribution of aerosol particles (number concentration) vs. critical supersaturations, in exactly the same manner as given for the Adiabatic Expansion Module.

6. The clock times at the beginning of the experiment (TMZERO), at the end of the expansion phase (TIMEF), and at the end of the experiment (TIMEND), and the time increment for output points (TIMOUT), all in seconds.

7. The thermal accommodation coefficient (ALPHA) and the condensation coefficient (BETA).

8. The number of expansion phases (NMOPT).

9. The expansion option (OPT), the expansion rate (DPRATE) in mb/sec, and the time at end of expansion in seconds for each of the expansion phases. DPRATE is negative for an expansion.

The input stream for the Multiple Expansion Module consists of the parameters delineated in Figure 3-19. These parameters are input using punched cards. The format of the data cards is described in Figure 3-20. Note that more than one experiment may be run at the same time by submitting multiple input data sets as described in Section 3.3.

3.2.2.1 Non-Adiabatic Expansion Experiment Example

An example is given to illustrate the simulation of the Non-Adiabatic Expansion Experiment. The listing of the input data cards is given in Figure 3-21 with the corresponding output listing shown in Figure 3-22.

Parameters	Units
Experiment name	(designated name for the Non-adiabatic Expansion Experiment)
Number of grid points	
Geometric configuration	
Grid spacing	Centimeters
Saturator temperature	degrees K
Saturator pressure	millibars
Initial chamber temperature	degrees K
Initial chamber pressure	millibars
Number of particle classes	
Reference volume for determining droplet concentration	
For each class:	
Number of particles	
Critical supersaturation	
Start time	seconds
Expansion duration	seconds
Finish time	seconds
Output time increment	seconds
Thermal accommodation coefficient	
Condensation coefficient	
Number of Expansions	
Expansion Option Name	'DPDT' or 'SEALED'
Expansion rate	millibars/second
Time at end of expansion	seconds

FIGURE 3-19. NON-ADIABATIC EXPANSION MODULE PARAMETERS

CARD	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment Option	A8	NADI EXP
2	1-5	Number of grid points	I5	Right justified in field
2	6-10	Geometric Configuration of the Chamber: 0 - Rectangular Coord. 1 - Cylindrical Coord. 2 - Spherical Coord.	I5	Right justified in field
2	11-20	Grid spacing	F10.5	
3	1-10	Saturator temperature	F10.5	
3	11-20	Saturator pressure	F10.5	
4	1-10	Initial chamber temperature	F10.5	
4	11-20	Initial chamber pressure	F10.5	
5	1-5	Number of classes of droplet-M	I5	Right justified in field
5	6-15	Reference volume	F10.5	The input reference volume is needed only if concentrations are expressed in units other than cc. If initial concentrations are given in no/cc, the program automatically sets this parameter to unity.
I+5	1-10	Number of particles in the Ith Class within reference volume	F10.5	
I+5	11-20	Critical supersaturation of the Ith Class (I = 1, 2, 3, ...M)	F10.5	Actual value, not percent

Figure 3-20. Format of Input Data Cards for Non-Adiabatic Simulation Run

CARD	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
M+5	1-10	Number of particles in the Mth Class within reference volume	F10.5	
M+5	11-20	Critical supersaturation of the Mth class	F10.5	
M+6	1-10	Start time	F10.5	
M+6	11-20	Expansion duration	F10.5	
M+6	21-30	Finish time	F10.5	
M+6	31-40	Output time increment	F10.5	
M+7	1-10	Thermal accommodation coefficient	F10.5	
M+7	11-20	Condensation coefficient	F10.5	
M+8	1-5	Number of expansions - N	I5	Right justified in field
M+J+8	1-8	Name of expansion phase in Jth expansion	A8	DPDT or SEALED. Left justified in field
M+J+8	9-18	Expansion rate for the Jth expansion	F10.5	
M+J+8	19-28	Time at end of Jth expansion	F10.5	

(J = 1, 2, 3, ...,N)

(F10.5 is standard FORTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-20. Format of Input Data Cards for Non-Adiabatic Simulation Run (Concluded)

```
      1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
NACT EXP
   11     2      1.82
  291.45      1C23.
  293.15      1C23.
    1     1.
  2C0.         .C5
    0.         6CC.        1C.
    1.          .03
    2
DPCT        -1.21          25.
DPCT         C.C           6CC.
```

Figure 3-21. Input Card Images of Non-Adiabatic Expansion Experiment Run

```
INPUT PARAMETERS FOR ACM-ADIABATIC EXPANSION CHAMBER EXPERIMENT WITH MULTIPLE EXPANSIONS

 SATURATION TEMPERATURE      291.450 DEG K
 SATURATION PRESSURE        1023.000 MB
 INITIAL CHAMBER TEMP        293.150 DEG K
 INITIAL CHAMBER PRESSURE   1023.000 MB
 EXPERIMENT DURATION         600.000 SEC
 ACCOMODATION COEFF            1.000
 CONDENSATION COEFF            0.030
 PRESSURE OPTION 1  OPUT
          RATE =   -1.210 MB      TIME =   25.000 SEC
 PRESSURE OPTION 2  OPUT
          RATE =    0.0   MB      TIME =  600.000 SEC

 GRID PARAMETERS
      SPHERICAL COORDINATES
      NUMBER OF SPACE POINTS=  11
      GRID SPACING          =  1.82 CM

      INDEX  POSITION        VOLUME          AREA
          1     0.0      0.251190D 00    0.828100 CC
          2     1.82000  0.653190D 01    0.745250 C1
          3     3.64000  0.246110 02     0.207020 02
          4     5.46000  0.547590 02     0.405770 C2
          5     7.28000  0.965590 02     0.670760 C2
          6     9.10000  0.151220 03     0.100200 C3
          7    10.92000  0.211530 03     0.134950 C3
          8    12.74000  0.285560 03     0.180320 03
          9    14.56000  0.386350 03     0.239320 03
         10    16.38000  0.488820 03     0.298560 03
         11    18.20000  0.266610 03

 INTEGRATION TIME INCREMENT =  0.50

 BERGSEL/OKOPLOT PARAMETERS

 NUMBER OF DROPLET CLASSES=  1

 CLASS     NC/CC        CRIT SSAT    CRIT RADIUS    INIT RADIUS          A            B
     1    200.00        0.15000     0.14763E-05    0.67245E-06    0.11087E-04  0.10768D-14

 TIME=  10. SEC          PRESSURE=1010.50 MB          TOTAL VOLUME= 2029.131 CC

      J     TEMP      VAPRAT     LPXRAT   SUPERSAT ACT  DROPS     DROP RAD
            DEG K      G/KG       G/KG     PERCENT      NC/CC      MICRON
      1   292.157  13.04583  0.0000000  -5.46455       0.0       0.00727
      2   292.157  13.04583  0.0000000  -5.46459       0.0       0.00727
      3   292.157  13.04583  0.0000000  -5.46459       0.0       0.00727
      4   292.157  13.04583  0.0000000  -5.46459       0.0       0.00727
      5   292.157  13.04583  0.0000000  -5.46462       0.0       0.00727
      6   292.157  13.04583  0.0000000  -5.46478       0.0       0.00727
      7   292.157  13.04583  0.0000000  -5.46574       0.0       0.00727
      8   292.163  13.04583  0.0000000  -5.50091       0.0       0.00727
      9   292.200  13.04583  0.0000000  -5.72022       0.0       0.00724
     10   292.365  13.04583  0.0000000  -6.86263       0.0       0.00709
     11   293.150  13.04583  0.0000000 -11.13405       0.0       0.00582

 TIME=  20. SEC          PRESSURE= 998.80 MB          TOTAL VOLUME= 2047.672 CC

      J     TEMP      VAPRAT     LPXRAT   SUPERSAT ACT  DROPS     DROP RAD
            DEG K      G/KG       G/KG     PERCENT      NC/CC      MICRON
```

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation

1	291.155	13.04583	0.0000000	-0.53610	0.0	0.0C827
2	291.155	13.04583	0.0000000	-0.53611	0.0	0.0C827
3	291.155	13.04583	0.0000000	-0.53619	0.0	0.0C827
4	291.155	13.04583	0.0000000	-0.53668	0.0	0.0CE27
5	291.156	13.04583	0.0000000	-0.53955	0.0	0.0C827
6	291.158	13.04583	0.0000000	-0.55495	0.0	0.0C826
7	291.170	13.04583	0.0000000	-0.62871	0.0	0.0CE24
8	291.219	13.04583	0.0000000	-0.93540	0.0	0.0CE17
9	291.393	13.04583	0.0000000	-2.01347	0.0	0.0C742
10	291.907	13.04583	0.0000000	-5.12403	0.0	0.0C735
11	293.150	13.04583	0.0000000	-12.19774	0.0	0.0CC52

TIME= 30. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2058.914 CC

J	TEMP DEG K	VMXMAT G/KG	LMXMAT G/KG	SUPERSAT PERCENT	ACT CRCPS AC/CC	CRCP RAD MICRON
1	290.651	13.04583	0.0000000	2.05746	0.0	0.0C934
2	290.651	13.04583	0.0000000	2.05714	0.0	0.0C934
3	290.651	13.04583	0.0000000	2.05552	0.0	0.0C934
4	290.652	13.04583	0.0000000	2.04891	0.0	0.0C933
5	290.656	13.04583	0.0000000	2.02327	0.0	0.0C932
6	290.671	13.04583	0.0000000	1.93061	0.0	0.0C928
7	290.718	13.04583	0.0000000	1.62800	0.0	0.0091+
8	290.857	13.04583	0.0000000	0.73581	0.0	0.0CE70
9	291.214	13.04583	0.0000000	-1.56767	0.0	0.0CE10
10	291.974	13.04583	0.0000000	-6.45650	0.0	0.0C723
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0CE47

TIME= 40. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2060.168 CC

J	TEMP DEG K	VMXMAT G/KG	LMXMAT G/KG	SUPERSAT PERCENT	ACT CRCPS AC/CC	CRCP RAD MICRON
1	290.651	13.04583	0.0000000	2.05347	0.0	0.0C934
2	290.652	13.04583	0.0000000	2.05114	0.0	0.0C934
3	290.653	13.04583	0.0000000	2.04131	0.0	0.0C933
4	290.658	13.04583	0.0000000	2.00979	0.0	0.0C932
5	290.673	13.04583	0.0000000	1.91515	0.0	0.0C927
6	290.714	13.04583	0.0000000	1.64991	0.0	0.0C915
7	290.820	13.04583	0.0000000	0.97327	0.0	0.0CE85
8	291.061	13.04583	0.0000000	-0.54862	0.0	0.0C836
9	291.529	13.04583	0.0000000	-3.43517	0.0	0.0C767
10	292.270	13.04583	0.0000000	-7.81410	0.0	0.0C699
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0C647

TIME= 50. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2061.14E CC

J	TEMP DEG K	VMXMAT G/KG	LMXMAT G/KG	SUPERSAT PERCENT	ACT CRCPS AC/CC	CRCP RAD MICRON
1	290.654	13.04583	0.0000000	2.03456	0.0	0.0C933
2	290.656	13.04583	0.0000000	2.02638	0.0	0.0C932
3	290.661	13.04583	0.0000000	1.99358	0.0	0.0C931
4	290.675	13.04583	0.0000000	1.90477	0.0	0.0C926
5	290.715	13.04583	0.0000000	1.68394	0.0	0.0C916
6	290.788	13.04583	0.0000000	1.11555	0.0	0.0C894
7	290.935	13.04583	0.0000000	0.11549	0.0	0.0C85e
8	291.266	13.04583	0.0000000	-1.82938	0.0	0.0CE01
9	291.767	13.04583	0.0000000	-4.86657	0.0	0.0C741
10	292.439	13.04583	0.0000000	-8.78203	0.0	0.0CE67
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0CE47

TIME= 60. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2061.962 CC

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS MC/CC	CRCP RAD MICRON
1	290.663	13.04583	0.0000000	1.58144	0.0	0.000930
2	290.666	13.04583	0.0000000	1.56032	0.0	0.000929
3	290.678	13.04583	0.0000000	1.88498	0.0	0.000925
4	290.700	13.04583	0.0000000	1.70534	0.0	0.000917
5	290.726	13.04583	0.0000000	1.31586	0.0	0.000900
6	290.883	13.04583	0.0000000	0.55904	0.0	0.000871
7	291.101	13.04583	0.0000000	-0.80190	0.0	0.000820
8	291.451	13.04583	0.0000000	-2.52056	0.0	0.000776
9	291.945	13.04583	0.0000000	-5.52674	0.0	0.000724
10	292.545	13.04583	0.0000000	-9.38223	0.0	0.000683
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.000647

TIME= 70. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2062.666 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS MC/CC	CRCP RAD MICRON
1	290.680	13.04583	0.0000000	1.66851	0.0	0.000925
2	290.686	13.04583	0.0000000	1.82987	0.0	0.000923
3	290.707	13.04583	0.0000000	1.69430	0.0	0.000916
4	290.753	13.04583	0.0000000	1.40256	0.0	0.000903
5	290.840	13.04583	0.0000000	0.84504	0.0	0.000881
6	290.995	13.04583	0.0000000	-0.13370	0.0	0.000847
7	291.245	13.04583	0.0000000	-1.66562	0.0	0.000804
8	291.611	13.04583	0.0000000	-3.52864	0.0	0.000757
9	292.065	13.04583	0.0000000	-6.74364	0.0	0.000713
10	292.624	13.04583	0.0000000	-9.62858	0.0	0.000679
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.000647

TIME= 80. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2063.272 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS MC/CC	CRCP RAD MICRON
1	290.710	13.04583	0.0000000	1.67723	0.0	0.000916
2	290.719	13.04583	0.0000000	1.81554	0.0	0.000913
3	290.751	13.04583	0.0000000	1.41350	0.0	0.000904
4	290.819	13.04583	0.0000000	1.00675	0.0	0.000887
5	290.927	13.04583	0.0000000	0.29263	0.0	0.000861
6	291.105	13.04583	0.0000000	-0.85202	0.0	0.000826
7	291.380	13.04583	0.0000000	-2.53063	0.0	0.000785
8	291.768	13.04583	0.0000000	-4.79518	0.0	0.000743
9	292.357	13.04583	0.0000000	-7.39458	0.0	0.000704
10	292.883	13.04583	0.0000000	-10.17682	0.0	0.000671
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.000647

TIME= 90. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2063.817 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS MC/CC	CRCP RAD MICRON
1	290.753	13.04583	0.0000000	1.39568	0.0	0.000903
2	290.766	13.04583	0.0000000	1.31591	0.0	0.000900
3	290.808	13.04583	0.0000000	1.04695	0.0	0.000889
4	290.889	13.04583	0.0000000	0.53456	0.0	0.000865
5	291.022	13.04583	0.0000000	-0.30636	0.0	0.000842
6	291.224	13.04583	0.0000000	-1.56124	0.0	0.000807
7	291.506	13.04583	0.0000000	-3.25666	0.0	0.000769
8	291.887	13.04583	0.0000000	-5.46578	0.0	0.000731
9	292.390	13.04583	0.0000000	-7.52891	0.0	0.000697
10	292.734	13.04583	0.0000000	-10.44342	0.0	0.000669
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.000647

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

TIME= 100. SEC PRESSURE= 552.75 MB TOTAL VOLUME= 2064.306 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT ACT PERCENT	DRCPS NC/CC	DRCP RAD MICRON
1	290.810	13.04583	0.0000000	0.00000	0.0	0.000000
2	290.826	13.04583	0.0000000	0.00000	0.0	0.000000
3	290.877	13.04583	0.0000000	0.00000	0.0	0.000000
4	290.972	13.04583	0.0000000	0.00000	0.0	0.000000
5	291.121	13.04583	0.0000000	-0.02746	0.0	0.000000
6	291.326	13.04583	0.0000000	-0.25676	0.0	0.000000
7	291.621	13.04583	0.0000000	-3.99460	0.0	0.000000
8	291.972	13.04583	0.0000000	-6.08246	0.0	0.000000
9	292.368	13.04583	0.0000000	-8.37644	0.0	0.000000
10	292.774	13.04583	0.0000000	-10.66744	0.0	0.000000
11	293.150	13.04583	0.0000000	-12.72956	0.0	0.000000

TIME= 110. SEC PRESSURE= 552.75 MB TOTAL VOLUME= 2064.756 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT ACT PERCENT	DRCPS NC/CC	DRCP RAD MICRON
1	290.878	13.04583	0.0000000	0.00000	0.0	0.000000
2	290.957	13.04583	0.0000000	0.00000	0.0	0.000000
3	290.956	13.04583	0.0000000	0.00000	0.0	0.000000
4	291.061	13.04583	0.0000000	-0.55478	0.0	0.000000
5	291.222	13.04583	0.0000000	-1.55287	0.0	0.000000
6	291.443	13.04583	0.0000000	-2.91913	0.0	0.000000
7	291.727	13.04583	0.0000000	-4.62543	0.0	0.000000
8	292.064	13.04583	0.0000000	-6.52231	0.0	0.000000
9	292.435	13.04583	0.0000000	-8.75835	0.0	0.000000
10	292.818	13.04583	0.0000000	-10.85582	0.0	0.000000
11	293.150	13.04583	0.0000000	-12.72956	0.0	0.000000

TIME= 120. SEC PRESSURE= 552.75 MB TOTAL VOLUME= 2065.156 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT ACT PERCENT	DRCPS NC/CC	DRCP RAD MICRON
1	290.955	13.04583	0.0000000	0.11604	0.0	0.000000
2	290.978	13.04583	0.0000000	-0.01799	0.0	0.000000
3	291.041	13.04583	0.0000000	-0.42722	0.0	0.000000
4	291.155	13.04583	0.0000000	-1.13617	0.0	0.000000
5	291.322	13.04583	0.0000000	-2.17037	0.0	0.000000
6	291.545	13.04583	0.0000000	-3.53746	0.0	0.000000
7	291.824	13.04583	0.0000000	-5.20747	0.0	0.000000
8	292.146	13.04583	0.0000000	-7.10051	0.0	0.000000
9	292.459	13.04583	0.0000000	-8.84910	0.0	0.000000
10	292.823	13.04583	0.0000000	-11.11710	0.0	0.000000
11	293.150	13.04583	0.0000000	-12.72956	0.0	0.000000

TIME= 130. SEC PRESSURE= 552.75 MB TOTAL VOLUME= 2065.527 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT ACT PERCENT	DRCPS NC/CC	DRCP RAD MICRON
1	291.039	13.04583	0.0000000	-0.41531	0.0	0.000000
2	291.062	13.04583	0.0000000	-0.55789	0.0	0.000000
3	291.131	13.04583	0.0000000	-0.98572	0.0	0.000000
4	291.249	13.04583	0.0000000	-1.72443	0.0	0.000000
5	291.420	13.04583	0.0000000	-2.77182	0.0	0.000000
6	291.642	13.04583	0.0000000	-4.12274	0.0	0.000000
7	291.913	13.04583	0.0000000	-5.73458	0.0	0.000000
8	292.220	13.04583	0.0000000	-7.52626	0.0	0.000000
9	292.544	13.04583	0.0000000	-9.37905	0.0	0.000000

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

10	292.662	13.04583	C.0CCCCCO	-11.15723	C.0	0.0C661
11	293.150	13.04583	C.CCCOOCO	-12.72958	C.0	0.0C647

TIME= 140. SEC PRESSURE= 952.75 PB TOTAL VOLUME= 2065.865 CC

J	TEMP DEG K	VAXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CNCPS AC/CC	CNCP RAD MICRON
1	291.123	13.04583	C.CCCOOCC	-0.57294	C.0	0.0CE22
2	291.152	13.04583	C.CCCCOCO	-1.12040	C.0	0.0C618
3	291.723	13.04583	C.CCCOOCO	-1.50428	C.0	0.0C807
4	291.344	13.04583	C.0CCCCCO	-2.30406	C.0	0.0C750
5	291.515	13.04583	C.CCCCOCC	-3.35203	C.0	0.0C728
6	291.734	13.04583	C.CCCOOCO	-4.67158	C.0	0.0C744
7	291.955	13.04583	C.CCCCCCO	-6.21768	C.0	0.0C720
8	292.286	13.04583	C.CCCCCCO	-7.9Ce42	C.C	0.0C657
9	292.550	13.04583	C.CCCCOOO	-9.83567	C.0	0.0C677
10	292.885	13.04583	C.CCCCOCO	-11.28043	C.0	0.0C660
11	293.150	13.04583	C.CCCCOCO	-12.72958	C.0	0.0CE47

TIME= 150. SEC PRESSURE= 952.75 PB TOTAL VOLUME= 2066.185 CC

J	TEMP DEG K	VAXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CNCPS AC/CC	CNCP RAD MICRON
1	291.220	13.04583	C.CCCCOCO	-1.54385	C.C	0.0C8C8
2	291.244	13.04583	C.0CCCOOO	-1.66312	C.0	0.0C8C4
3	291.217	13.04583	C.CCCCCCO	-2.14033	C.0	0.0C793
4	291.433	13.04582	C.CCCCCCO	-2.88270	C.0	0.0C777
5	291.607	13.04583	C.CCCCOOO	-3.90704	C.0	0.0C757
6	291.820	13.04583	C.CCCCCCO	-5.13538	C.C	0.0C735
7	292.071	13.04583	C.CCCCCCO	-6.68063	C.0	0.0C713
8	292.346	13.04583	C.CCCCOCO	-8.25362	C.0	0.0C693
9	292.630	13.04583	C.CCCCOCO	-9.86532	C.0	0.0C674
10	292.905	13.04583	C.CCCOOCO	-11.3e536	C.0	0.0C659
11	293.150	13.04583	C.CCCCOCO	-12.72958	C.0	0.0CE47

TIME= 160. SEC PRESSURE= 952.75 PB TOTAL VOLUME= 2066.478 CC

J	TEMP DEG K	VAXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CNCPS AC/CC	CNCP RAD MICRON
1	291.313	13.04583	C.CCCCOCO	-2.11737	C.0	0.0C794
2	291.337	13.04583	C.CCCCOCO	-2.26558	C.0	0.0C790
3	291.410	13.04583	C.CCCCOCO	-2.75583	C.C	0.0C781
4	291.529	13.04583	C.CCCCCCO	-3.43997	C.0	0.0C766
5	291.655	13.04583	C.CCCCOOO	-4.43755	C.0	0.0C748
6	291.901	13.04583	C.CCCOOCO	-5.66558	C.0	0.0C728
7	292.141	13.04583	C.CCCCOCO	-7.06820	C.0	0.0C708
8	292.401	13.04583	C.CCCCCCO	-8.56715	0.0	0.0C689
9	292.667	13.04583	C.CCCCCCC	-10.07184	C.0	0.0CE72
10	292.922	13.04583	C.CCCCCCO	-11.4e7de	C.0	0.0CE53
11	293.150	13.04583	C.CCCCCCO	-12.72958	0.0	0.0CE47

TIME= 170. SEC PRESSURE= 952.75 PB TOTAL VOLUME= 2066.750 CC

J	TEMP DEG K	VAXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CNCPS AC/CC	CNCP RAD MICRON
1	291.405	13.04583	C.CCCOOCO	-2.66510	C.0	0.0C781
2	291.429	13.04583	C.CCCCOCO	-2.83118	C.0	0.0C77e
3	291.501	13.04583	C.CCCCCCO	-3.26604	C.0	0.0C769
4	291.618	13.04583	C.CCCCOCO	-3.97725	C.0	0.0C756
5	291.775	13.04583	C.CCCCCCO	-4.94041	C.0	0.0C739
6	291.978	13.04583	C.CCCCCCO	-6.11532	C.0	0.0C721

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

7	292.265	13.04583	0.0000000	-7.44417	0.0	0.00703
8	292.451	13.04583	0.0000000	-8.85326	0.0	0.00686
9	292.701	13.04583	0.0000000	-10.25889	0.0	0.00670
10	292.939	13.04583	0.0000000	-11.57627	0.0	0.00657
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 180. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2067.003 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	291.457	13.04583	0.0000000	-3.24070	0.0	0.00773
2	291.520	13.04583	0.0000000	-3.38285	0.0	0.00767
3	291.550	13.04583	0.0000000	-3.86510	0.0	0.00756
4	291.704	13.04583	0.0000000	-4.46217	0.0	0.00747
5	291.859	13.04583	0.0000000	-5.41637	0.0	0.00732
6	292.045	13.04583	0.0000000	-6.53537	0.0	0.00715
7	292.266	13.04583	0.0000000	-7.79175	0.0	0.00695
8	292.457	13.04583	0.0000000	-9.11544	0.0	0.00683
9	292.731	13.04583	0.0000000	-10.42923	0.0	0.00666
10	292.953	13.04583	0.0000000	-11.65151	0.0	0.00656
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 190. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2067.235 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	291.586	13.04583	0.0000000	-3.77957	0.0	0.00760
2	291.668	13.04583	0.0000000	-3.51681	0.0	0.00757
3	291.676	13.04583	0.0000000	-4.32378	0.0	0.00750
4	291.788	13.04583	0.0000000	-4.58335	0.0	0.00739
5	291.939	13.04583	0.0000000	-5.86506	0.0	0.00725
6	292.117	13.04583	0.0000000	-6.92807	0.0	0.00710
7	292.322	13.04583	0.0000000	-8.11374	0.0	0.00695
8	292.540	13.04583	0.0000000	-9.35852	0.0	0.00680
9	292.756	13.04583	0.0000000	-10.58505	0.0	0.00667
10	292.966	13.04583	0.0000000	-11.72971	0.0	0.00656
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 200. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2067.455 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	291.672	13.04583	0.0000000	-4.25851	0.0	0.00750
2	291.654	13.04583	0.0000000	-4.43018	0.0	0.00748
3	291.756	13.04583	0.0000000	-4.82014	0.0	0.00741
4	291.865	13.04583	0.0000000	-5.45016	0.0	0.00731
5	292.007	13.04583	0.0000000	-6.26954	0.0	0.00719
6	292.180	13.04583	0.0000000	-7.29522	0.0	0.00705
7	292.374	13.04583	0.0000000	-8.41255	0.0	0.00691
8	292.575	13.04583	0.0000000	-9.57885	0.0	0.00678
9	292.765	13.04583	0.0000000	-10.72816	0.0	0.00666
10	292.979	13.04583	0.0000000	-11.75679	0.0	0.00655
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 210. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2067.664 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	291.755	13.04583	0.0000000	-4.79547	0.0	0.00742
2	291.778	13.04583	0.0000000	-4.92118	0.0	0.00740
3	291.838	13.04583	0.0000000	-5.29310	0.0	0.00734

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

4	291.946	13.04583	0.0000000	-5.89250	0.0	0.00725
5	292.075	13.04583	0.0000000	-6.68849	0.0	0.00713
6	292.234	13.04583	0.0000000	-7.63855	0.0	0.00700
7	292.423	13.04583	0.0000000	-8.69026	0.0	0.00688
8	292.616	13.04583	0.0000000	-9.78452	0.0	0.00675
9	292.809	13.04583	0.0000000	-10.86004	0.0	0.00664
10	292.990	13.04583	0.0000000	-11.85849	0.0	0.00655
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 220. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2067.852 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LPCPS AC/CC	LPCP RAD MICRON
1	291.839	13.04583	0.0000000	-5.26925	0.0	0.00734
2	291.854	13.04583	0.0000000	-5.38880	0.0	0.00732
3	291.914	13.04583	0.0000000	-5.74221	0.0	0.00727
4	292.011	13.04583	0.0000000	-6.31067	0.0	0.00718
5	292.140	13.04583	0.0000000	-7.06361	0.0	0.00708
6	292.295	13.04583	0.0000000	-7.95966	0.0	0.00696
7	292.468	13.04583	0.0000000	-8.94870	0.0	0.00685
8	292.650	13.04583	0.0000000	-9.97510	0.0	0.00673
9	292.821	13.04583	0.0000000	-10.98191	0.0	0.00663
10	293.000	13.04583	0.0000000	-11.91542	0.0	0.00654
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 230. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.035 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LPCPS AC/CC	LPCP RAD MICRON
1	291.818	13.04583	0.0000000	-5.71933	0.0	0.00727
2	291.930	13.04583	0.0000000	-5.83266	0.0	0.00725
3	291.980	13.04583	0.0000000	-6.18750	0.0	0.00720
4	292.078	13.04583	0.0000000	-6.76525	0.0	0.00713
5	292.201	13.04583	0.0000000	-7.41807	0.0	0.00703
6	292.347	13.04583	0.0000000	-8.26004	0.0	0.00693
7	292.511	13.04583	0.0000000	-9.18947	0.0	0.00682
8	292.682	13.04583	0.0000000	-10.15206	0.0	0.00671
9	292.851	13.04583	0.0000000	-11.05480	0.0	0.00662
10	293.010	13.04583	0.0000000	-11.96809	0.0	0.00654
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 240. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.203 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LPCPS AC/CC	LPCP RAD MICRON
1	291.783	13.04583	0.0000000	-6.14565	0.0	0.00721
2	292.001	13.04583	0.0000000	-6.25286	0.0	0.00719
3	292.055	13.04583	0.0000000	-6.56534	0.0	0.00715
4	292.142	13.04583	0.0000000	-7.07703	0.0	0.00708
5	292.258	13.04583	0.0000000	-7.74702	0.0	0.00699
6	292.396	13.04583	0.0000000	-8.54109	0.0	0.00689
7	292.550	13.04583	0.0000000	-9.41401	0.0	0.00679
8	292.711	13.04583	0.0000000	-10.31664	0.0	0.00670
9	292.870	13.04583	0.0000000	-11.19980	0.0	0.00661
10	293.015	13.04583	0.0000000	-12.01654	0.0	0.00653
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 250. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.361 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LPCPS AC/CC	LPCP RAD MICRON

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

J	TEMP DEG K	VAPRAT G/KG	LIQRAT G/KG	SUPERSAT PERCENT	ACT CNCPS KG/CC	CNCP RAD MICRON
1	292.051	13.04583	0.0000000	-6.54865	0.0	0.00715
2	292.069	13.04583	0.0000000	-6.64474	0.0	0.00714
3	292.120	13.04583	0.0000000	-6.94837	0.0	0.00710
4	292.202	13.04583	0.0000000	-7.42690	0.0	0.00703
5	292.312	13.04583	0.0000000	-8.05763	0.0	0.00695
6	292.443	13.04583	0.0000000	-8.80411	0.0	0.00686
7	292.587	13.04583	0.0000000	-9.62357	0.0	0.00677
8	292.739	13.04583	0.0000000	-10.46550	0.0	0.00668
9	292.888	13.04583	0.0000000	-11.25704	0.0	0.00660
10	293.027	13.04583	0.0000000	-12.06233	0.0	0.00653
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 260. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.508 CC

J	TEMP DEG K	VAPRAT G/KG	LIQRAT G/KG	SUPERSAT PERCENT	ACT CNCPS KG/CC	CNCP RAD MICRON
1	292.117	13.04583	0.0000000	-6.52881	0.0	0.00710
2	292.133	13.04583	0.0000000	-7.02412	0.0	0.00709
3	292.181	13.04583	0.0000000	-7.30539	0.0	0.00705
4	292.259	13.04583	0.0000000	-7.75585	0.0	0.00699
5	292.363	13.04583	0.0000000	-8.34901	0.0	0.00692
6	292.486	13.04583	0.0000000	-9.05028	0.0	0.00683
7	292.622	13.04583	0.0000000	-9.81930	0.0	0.00675
8	292.764	13.04583	0.0000000	-10.61280	0.0	0.00667
9	292.904	13.04583	0.0000000	-11.38778	0.0	0.00659
10	293.035	13.04583	0.0000000	-12.10458	0.0	0.00652
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 270. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.648 CC

J	TEMP DEG K	VAPRAT G/KG	LIQRAT G/KG	SUPERSAT PERCENT	ACT CNCPS KG/CC	CNCP RAD MICRON
1	292.176	13.04583	0.0000000	-7.28695	0.0	0.00705
2	292.194	13.04583	0.0000000	-7.37864	0.0	0.00704
3	292.240	13.04583	0.0000000	-7.64124	0.0	0.00700
4	292.313	13.04583	0.0000000	-8.06489	0.0	0.00695
5	292.411	13.04583	0.0000000	-8.62229	0.0	0.00686
6	292.527	13.04583	0.0000000	-9.28074	0.0	0.00681
7	292.655	13.04583	0.0000000	-10.00222	0.0	0.00673
8	292.788	13.04583	0.0000000	-10.74816	0.0	0.00665
9	292.920	13.04583	0.0000000	-11.47239	0.0	0.00658
10	293.042	13.04583	0.0000000	-12.14395	0.0	0.00652
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 280. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.778 CC

J	TEMP DEG K	VAPRAT G/KG	LIQRAT G/KG	SUPERSAT PERCENT	ACT CNCPS KG/CC	CNCP RAD MICRON
1	292.237	13.04583	0.0000000	-7.62394	0.0	0.00701
2	292.251	13.04583	0.0000000	-7.70827	0.0	0.00700
3	292.294	13.04583	0.0000000	-7.95704	0.0	0.00696
4	292.364	13.04583	0.0000000	-8.35937	0.0	0.00692
5	292.456	13.04583	0.0000000	-8.87853	0.0	0.00685
6	292.565	13.04583	0.0000000	-9.49691	0.0	0.00678
7	292.685	13.04583	0.0000000	-10.17325	0.0	0.00671
8	292.811	13.04583	0.0000000	-10.87071	0.0	0.00664
9	292.934	13.04583	0.0000000	-11.55136	0.0	0.00657
10	293.049	13.04583	0.0000000	-12.18069	0.0	0.00652
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 290. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2068.857 CC

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	CRCPS KG/CC	CRCP RAD PICRCN
1	292.292	13.04583	C.CCCCOOOO	-7.54076	C.0	0.0C647
2	292.305	13.04583	C.CCCCCCO	-8.01997	C.0	C.0C656
3	292.346	13.04583	C.CCCCCCO	-8.25364	C.0	0.0C653
4	292.412	13.04583	C.CCCCOOO	-8.62741	C.0	0.0C668
5	292.458	13.04583	C.CCCCCCO	-9.11876	C.0	C.0C683
6	292.601	13.04583	C.CCCCOCO	-9.65857	C.0	0.0C676
7	292.714	13.04583	C.CCCCCCO	-10.33324	C.0	0.0C67C
8	292.832	13.04583	C.CCCCCCO	-10.96713	C.0	C.0C673
9	292.947	13.04583	C.CCCCCCO	-11.62512	C.0	0.0C657
10	293.055	13.04583	C.CCCCOCO	-12.21501	C.0	C.0C651
11	293.150	13.04583	C.CCCOOCO	-12.72956	C.0	0.0C647

TIME= 300. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.011 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	CRCPS KG/CC	CRCP RAD PICRCN
1	292.343	13.04583	C.CCCCCCO	-8.23836	C.0	C.0C693
2	292.356	13.04583	C.CCCCOCO	-8.31275	C.0	0.0C692
3	292.395	13.04583	C.CCCCCCO	-8.53211	C.0	C.0C689
4	292.456	13.04583	C.CCCCCCO	-8.88251	C.0	0.0C685
5	292.538	13.04583	C.CCCCCCO	-9.34394	C.0	0.0C680
6	292.624	13.04583	C.CCCCOCO	-9.88781	C.0	C.0C674
7	292.741	13.04583	C.CCCCCCO	-10.48256	C.0	0.0C668
8	292.851	13.04583	C.CCCCCCO	-11.15001	C.0	C.0C662
9	292.969	13.04583	C.CCCCCCO	-11.85408	C.0	C.0C656
10	293.061	13.04583	C.CCCCCCO	-12.24708	C.0	0.0C651
11	293.150	13.04583	C.CCCCCCO	-12.72956	C.0	C.0C647

TIME= 310. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.118 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	CRCPS KG/CC	CRCP RAD PICRCN
1	292.352	13.04583	C.CCCCCCO	-8.51761	C.C	C.0C69J
2	292.405	13.04583	C.CCCCCCO	-8.58760	C.0	C.0C689
3	292.441	13.04583	C.CCCCCCO	-8.79343	C.C	0.0C686
4	292.455	13.04583	C.CCCCCCO	-9.12256	C.C	0.0C683
5	292.515	13.04583	C.CCCCCCC	-9.55501	C.0	0.0C678
6	292.606	13.04583	C.CCCCCCO	-10.06506	C.C	0.0C672
7	292.766	13.04583	C.CCCCCCO	-10.62311	C.C	C.0C667
8	292.870	13.04583	C.CCCCCCO	-11.19788	C.C	C.0C661
9	292.972	13.04583	C.CCCCCCO	-11.75859	C.C	0.0C655
10	293.067	13.04583	C.CCCCCCO	-12.27765	C.C	C.0C651
11	293.150	13.04583	C.CCCCCCO	-12.72958	C.C	0.0C647

TIME= 320. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.218 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	CRCPS KG/CC	CRCP RAD PICRCN
1	292.428	13.04583	C.CCCCCCO	-8.78005	C.0	0.0C6E7
2	292.435	13.04583	C.CCCCCCO	-8.84991	C.0	0.0C6E6
3	292.464	13.04583	C.CCCCCCO	-9.03859	C.0	0.0C6E4
4	292.520	13.04583	C.CCCCCCO	-9.34728	C.0	0.0C6E0
5	292.610	13.04583	C.CCCCCCO	-9.75284	C.0	0.0C676
6	292.656	13.04583	C.CCCCCCO	-10.23111	C.C	0.0C671
7	292.790	13.04583	C.CCCCCCO	-10.75435	C.0	0.0C665
8	292.887	13.04583	C.CCCCCCO	-11.25323	C.0	C.0C660
9	292.983	13.04583	C.CCCCCCO	-11.81856	C.0	0.0C655
10	293.072	13.04583	C.CCCCOCO	-12.30917	C.C	0.0C650
11	293.150	13.04583	C.CCCCCCO	-12.72956	C.0	0.0C647

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

TIME= 330. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.312 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS KC/CC	CRCP RAD PICRCK
1	292.462	13.04583	0.00000000	-9.02607	0.0	0.000684
2	292.462	13.04583	0.00000000	-9.08746	0.0	0.000683
3	292.524	13.04583	0.00000000	-9.20892	0.0	0.000681
4	292.576	13.04583	0.00000000	-9.55758	0.0	0.000674
5	292.643	13.04583	0.00000000	-9.93826	0.0	0.000674
6	292.724	13.04583	0.00000000	-10.33665	0.0	0.000669
7	292.812	13.04583	0.00000000	-10.87726	0.0	0.000664
8	292.903	13.04583	0.00000000	-11.38252	0.0	0.000659
9	292.993	13.04583	0.00000000	-11.87546	0.0	0.000654
10	293.077	13.04583	0.00000000	-12.33167	0.0	0.000650
11	293.150	13.04583	0.00000000	-12.72958	0.0	0.000647

TIME= 340. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.400 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS KC/CC	CRCP RAD PICRCK
1	292.522	13.04583	0.00000000	-9.25681	0.0	0.000681
2	292.522	13.04583	0.00000000	-9.31437	0.0	0.000680
3	292.583	13.04583	0.00000000	-9.48412	0.0	0.000677
4	292.611	13.04583	0.00000000	-9.73551	0.0	0.000676
5	292.674	13.04583	0.00000000	-10.11204	0.0	0.000672
6	292.750	13.04583	0.00000000	-10.53246	0.0	0.000667
7	292.833	13.04583	0.00000000	-10.99241	0.0	0.000663
8	292.918	13.04583	0.00000000	-11.46616	0.0	0.000658
9	293.003	13.04583	0.00000000	-11.92343	0.0	0.000654
10	293.081	13.04583	0.00000000	-12.35810	0.0	0.000650
11	293.150	13.04583	0.00000000	-12.72958	0.0	0.000647

TIME= 350. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.483 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS KC/CC	CRCP RAD PICRCK
1	292.561	13.04583	0.00000000	-9.47318	0.0	0.000679
2	292.570	13.04583	0.00000000	-9.52713	0.0	0.000678
3	292.599	13.04583	0.00000000	-9.68627	0.0	0.000676
4	292.644	13.04583	0.00000000	-9.94065	0.0	0.000674
5	292.704	13.04583	0.00000000	-10.27492	0.0	0.000670
6	292.774	13.04583	0.00000000	-10.66567	0.0	0.000666
7	292.852	13.04583	0.00000000	-11.10030	0.0	0.000662
8	292.933	13.04583	0.00000000	-11.54451	0.0	0.000657
9	293.012	13.04583	0.00000000	-11.97803	0.0	0.000653
10	293.085	13.04583	0.00000000	-12.37918	0.0	0.000650
11	293.150	13.04583	0.00000000	-12.72958	0.0	0.000647

TIME= 360. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2069.566 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CRCPS KC/CC	CRCP RAD PICRCK
1	292.597	13.04583	0.00000000	-9.67605	0.0	0.000677
2	292.606	13.04583	0.00000000	-9.72002	0.0	0.000676
3	292.632	13.04583	0.00000000	-9.87574	0.0	0.000674
4	292.675	13.04583	0.00000000	-10.11427	0.0	0.000672
5	292.731	13.04583	0.00000000	-10.42754	0.0	0.000669
6	292.797	13.04583	0.00000000	-10.79734	0.0	0.000665
7	292.870	13.04583	0.00000000	-11.20141	0.0	0.000661
8	292.946	13.04583	0.00000000	-11.61754	0.0	0.000657
9	293.020	13.04583	0.00000000	-12.02452	0.0	0.000653

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

10	293.085	13.04583	0.0000000	-12.40081	0.0	0.00650
11	293.150	13.04583	0.0000000	-12.72956	0.0	0.00647

TIME= 370. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.633 CC

J	TEMP DEG K	VAPRAT G/KG	LWCRAT G/KG	SUPERSAT PERCENT	ACT LWCPS NG/CC	LWCP RAD MICRON
1	292.631	13.04583	0.0000000	-9.86623	0.0	0.00674
2	292.635	13.04583	0.0000000	-9.91363	0.0	0.00674
3	292.684	13.04583	0.0000000	-10.05344	0.0	0.00672
4	292.704	13.04583	0.0000000	-10.27698	0.0	0.00670
5	292.757	13.04583	0.0000000	-10.57008	0.0	0.00667
6	292.815	13.04583	0.0000000	-10.91708	0.0	0.00664
7	292.888	13.04583	0.0000000	-11.29217	0.0	0.00660
8	292.955	13.04583	0.0000000	-11.66677	0.0	0.00656
9	293.028	13.04583	0.0000000	-12.06810	0.0	0.00653
10	293.093	13.04583	0.0000000	-12.42110	0.0	0.00649
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 380. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.762 CC

J	TEMP DEG K	VAPRAT G/KG	LWCRAT G/KG	SUPERSAT PERCENT	ACT LWCPS NG/CC	LWCP RAD MICRON
1	292.662	13.04583	0.0000000	-10.04451	0.0	0.00673
2	292.670	13.04583	0.0000000	-10.08893	0.0	0.00672
3	292.654	13.04583	0.0000000	-10.21997	0.0	0.00671
4	292.731	13.04583	0.0000000	-10.42950	0.0	0.00669
5	292.781	13.04583	0.0000000	-10.70480	0.0	0.00666
6	292.835	13.04583	0.0000000	-11.02556	0.0	0.00662
7	292.904	13.04583	0.0000000	-11.38455	0.0	0.00659
8	292.970	13.04583	0.0000000	-11.75129	0.0	0.00656
9	293.038	13.04583	0.0000000	-12.12896	0.0	0.00652
10	293.097	13.04583	0.0000000	-12.44011	0.0	0.00649
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 390. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.788 CC

J	TEMP DEG K	VAPRAT G/KG	LWCRAT G/KG	SUPERSAT PERCENT	ACT LWCPS NG/CC	LWCP RAD MICRON
1	292.692	13.04583	0.0000000	-10.21163	0.0	0.00671
2	292.700	13.04583	0.0000000	-10.25326	0.0	0.00670
3	292.722	13.04583	0.0000000	-10.37608	0.0	0.00669
4	292.797	13.04583	0.0000000	-10.57246	0.0	0.00667
5	292.803	13.04583	0.0000000	-10.83054	0.0	0.00664
6	292.858	13.04583	0.0000000	-11.13499	0.0	0.00661
7	292.919	13.04583	0.0000000	-11.47826	0.0	0.00658
8	292.981	13.04583	0.0000000	-11.81178	0.0	0.00655
9	293.043	13.04583	0.0000000	-12.14727	0.0	0.00652
10	293.100	13.04583	0.0000000	-12.45795	0.0	0.00649
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.00647

TIME= 400. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.826 CC

J	TEMP DEG K	VAPRAT G/KG	LWCRAT G/KG	SUPERSAT PERCENT	ACT LWCPS NG/CC	LWCP RAD MICRON
1	292.720	13.04583	0.0000000	-10.36928	0.0	0.00669
2	292.727	13.04583	0.0000000	-10.40730	0.0	0.00669
3	292.748	13.04583	0.0000000	-10.52241	0.0	0.00668
4	292.781	13.04583	0.0000000	-10.70648	0.0	0.00666
5	292.825	13.04583	0.0000000	-10.94840	0.0	0.00663
6	292.876	13.04583	0.0000000	-11.23384	0.0	0.00660

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

7	292.933	13.045E3	C.CCCCCCC	-11.54634	C.C	0.0C657
8	292.992	13.045E3	C.CCCCCCC	-11.8C850	C.C	0.0C654
9	293.C44	13.045E3	C.CCCCCCC	-12.10314	C.C	0.0C652
10	293.1C3	13.045E3	C.CCCCCCC	-12.47468	C.C	0.0C649
11	293.150	13.045E3	C.CCCCCCC	-12.72958	C.C	0.0C647

TIME= 410. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.8E3 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT	EPCPS MG/CC	EPCP RAD MICRON
1	292.747	13.045E3	C.CCCCCCC	-10.91514		C.C	C.0C660
2	292.7E3	13.045E3	C.CCCCCCC	-10.55167		C.C	C.0C667
3	292.779	13.045E3	C.CCCCCCC	-10.65957		C.C	0.0C666
4	292.8C4	13.045E3	C.CCCCCCC	-10.83211		C.C	0.0C664
5	292.845	13.045E3	C.CCCCCCC	-11.05887		C.C	0.0C662
6	292.893	13.045E3	C.CCCCCCC	-11.32651		C.C	C.0C66J
7	292.946	13.045E3	C.CCCCCCC	-11.61454		C.C	C.0C657
8	293.CC2	13.045E3	C.CCCCCCC	-11.92169		C.C	0.0C654
9	293.056	13.045E3	C.CCCCCCC	-12.21689		C.C	C.0C651
10	293.1C6	13.045E3	C.CCCCCCC	-12.45C38		C.C	0.0C645
11	293.15C	13.045E3	C.CCCCCCC	-12.72958		C.C	0.0C647

TIME= 420. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.93E CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT	EPCPS MG/CC	EPCP RAD MICRON
1	292.771	13.045E3	C.CCCCCCC	-10.85276		C.C	C.0C666
2	292.778	13.045E3	C.CCCCCCC	-10.EE704		C.C	C.0C666
3	292.756	13.045E3	C.CCCCCCC	-10.78016		C.C	0.0C665
4	292.825	13.045E3	C.CCCCCCC	-10.54589		C.C	0.0C663
5	292.8E3	13.045E3	C.CCCCCCC	-11.16247		C.C	0.0C661
E	292.9C5	13.045E3	C.CCCCCCC	-11.41340		C.C	C.0C657
7	292.955	13.045E3	C.CCCCCCC	-11.68819		C.C	C.0C65e
8	293.011	13.045E3	C.CCCCCCC	-11.97157		C.C	0.0CE53
9	293.CE1	13.045E3	C.CCCCCCC	-12.24850		C.C	0.0C651
10	293.1C9	13.045E3	C.CCCCCCC	-12.5C510		C.C	0.0CE49
11	293.150	13.045E3	C.CCCCCCC	-12.72958		C.C	0.0C647

TIME= 430. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2065.9EE CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT	EPCPS MG/CC	EPCP RAD MICRON
1	292.755	13.045E3	C.CCCCCCC	-10.78174		C.C	C.0CE65
2	292.7EC	13.045E3	C.CCCCCCC	-10.81391		C.C	0.0CE65
3	292.81e	13.045E3	C.CCCCCCC	-10.9C870		C.C	0.0CE64
4	292.E45	13.045E3	C.CCCCCCC	-11.CE030		C.C	0.0CE62
5	292.E81	13.045E3	C.CCCCCCC	-11.25961		C.C	0.0C660
6	292.924	13.045E3	C.CCCCCCC	-11.45427		C.C	0.0CE5E
7	292.971	13.045E3	C.CCCCCCC	-11.75256		C.C	0.0C65e
8	293.C19	13.045E3	C.CCCCCCC	-12.C1836		C.C	0.0CE53
9	293.C67	13.045E3	C.CCCCCCC	-12.27815		C.C	0.0CE51
10	293.111	13.045E3	C.CCCCCCC	-12.51892		C.C	0.0CE48
11	293.150	13.045E3	C.CCCCCCC	-12.72958		0.0	0.0C647

TIME= 440. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 207C.022 CC

J	TEMP DEG K	VMXRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT	EPCPS MG/CC	EPCP RAD MICRON
1	292.81e	13.045E3	C.CCCCCCC	-10.90274		C.C	0.0CE64
2	292.822	13.045E3	C.CCCCCCC	-10.93289		C.C	0.0CE63
3	292.828	13.045E3	C.CCCCCCC	-11.02170		0.0	0.0C663

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

4	292.864	13.04583	0.0000000	-11.16304	0.0	0.0C681
5	292.898	13.04583	0.0000000	-11.35067	0.0	0.0C654
6	292.938	13.04583	0.0000000	-11.57127	0.0	0.0C657
7	292.982	13.04583	0.0000000	-11.81293	0.0	0.0C655
8	293.027	13.04583	0.0000000	-12.06224	0.0	0.0C651
9	293.072	13.04583	0.0000000	-12.30596	0.0	0.0C650
10	293.114	13.04583	0.0000000	-12.53106	0.0	0.0C648
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0C647

TIME= 450. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.372 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LWCPS AL/CC	LWCP RAC PICMCM
1	292.837	13.04583	0.0000000	-11.01813	0.0	0.0C663
2	292.842	13.04583	0.0000000	-11.04435	0.0	0.0C662
3	292.857	13.04583	0.0000000	-11.12764	0.0	0.0C662
4	292.881	13.04583	0.0000000	-11.26067	0.0	0.0C660
5	292.913	13.04583	0.0000000	-11.43806	0.0	0.0C658
6	292.951	13.04583	0.0000000	-11.64241	0.0	0.0C657
7	292.992	13.04583	0.0000000	-11.86955	0.0	0.0C654
8	293.035	13.04583	0.0000000	-12.10341	0.0	0.0C652
9	293.077	13.04583	0.0000000	-12.33205	0.0	0.0C650
10	293.116	13.04583	0.0000000	-12.54404	0.0	0.0C648
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0C647

TIME= 460. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.111 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LWCPS AL/CC	LWCP RAC PICMCM
1	292.856	13.04583	0.0000000	-11.12243	0.0	0.0C662
2	292.861	13.04583	0.0000000	-11.14885	0.0	0.0C661
3	292.875	13.04583	0.0000000	-11.22856	0.0	0.0C661
4	292.898	13.04583	0.0000000	-11.35187	0.0	0.0C659
5	292.928	13.04583	0.0000000	-11.51613	0.0	0.0C658
6	292.963	13.04583	0.0000000	-11.71010	0.0	0.0C656
7	293.002	13.04583	0.0000000	-11.92206	0.0	0.0C654
8	293.042	13.04583	0.0000000	-12.14202	0.0	0.0C652
9	293.081	13.04583	0.0000000	-12.35654	0.0	0.0C650
10	293.118	13.04583	0.0000000	-12.55545	0.0	0.0C648
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0C647

TIME= 470. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.152 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LWCPS AC/CC	LWCP RAC PICMCM
1	292.874	13.04583	0.0000000	-11.22265	0.0	0.0C661
2	292.879	13.04583	0.0000000	-11.24884	0.0	0.0C660
3	292.892	13.04583	0.0000000	-11.32808	0.0	0.0C660
4	292.913	13.04583	0.0000000	-11.43719	0.0	0.0C659
5	292.941	13.04583	0.0000000	-11.55121	0.0	0.0C657
6	292.974	13.04583	0.0000000	-11.77311	0.0	0.0C655
7	293.011	13.04583	0.0000000	-11.91247	0.0	0.0C653
8	293.049	13.04583	0.0000000	-12.17825	0.0	0.0C652
9	293.085	13.04583	0.0000000	-12.37351	0.0	0.0C650
10	293.120	13.04583	0.0000000	-12.56616	0.0	0.0C648
11	293.150	13.04583	0.0000000	-12.72958	0.0	0.0C647

TIME= 480. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.152 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT LWCPS AC/CC	LWCP RAC PICMCM

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

1	292.851	13.04583	C.CCCCOCO	-11.31553	C.C	0.0C660
2	292.895	13.04583	C.CCCCOCO	-11.33878	C.C	0.0C659
3	292.9C8	13.04583	C.CCCCOCO	-11.4C740	C.C	0.0C654
4	292.928	13.04583	C.CCCCOCO	-11.51720	C.C	0.0C658
5	292.954	13.04583	C.CCCCOCO	-11.66162	C.C	0.0C656
6	292.985	13.04583	C.CCCCOCO	-11.83221	C.C	0.0C655
7	293.C19	13.04583	C.CCCCOCO	-12.C1920	C.C	0.0C653
8	293.055	13.04583	C.CCCCOCO	-12.21223	C.C	0.0C651
9	293.C85	13.04583	C.CCCCOCO	-12.40116	C.C	0.0C650
10	293.122	13.04583	C.CCCCOCO	-12.57021	C.C	0.0C648
11	293.150	13.04583	C.CCCCOCO	-12.72958	C.C	0.0C647

TIME= 490. SEC PRESSURE= 992.75 MB TOTAL VOLUME= 2070.226 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CHGPS AC/CC	CHGP RAD FICRON
1	292.907	13.04583	C.CCCCOCO	-11.40314	C.C	0.0C659
2	292.911	13.04583	C.CCCCOCO	-11.42454	C.C	0.0C659
3	292.923	13.04583	C.CCCCOCO	-11.48927	C.C	0.0C658
4	292.941	13.04583	C.CCCCOCO	-11.58223	C.C	0.0C657
5	292.966	13.04583	C.CCCCOCO	-11.72166	C.C	0.0C656
6	292.995	13.04583	C.CCCCOCO	-11.88764	C.C	0.0C654
7	293.027	13.04583	C.CCCCOCO	-12.06303	C.C	0.0C653
8	293.061	13.04583	C.CCCCOCO	-12.24412	C.C	0.0C651
9	293.093	13.04583	C.CCCCOCO	-12.42128	C.C	0.0C649
10	293.123	13.04583	C.CCCCOCO	-12.58564	C.C	0.0C648
11	293.150	13.04583	C.CCCCOCO	-12.72958	C.C	0.0C647

TIME= 500. SEC PRESSURE= 992.75 MB TOTAL VOLUME= 2070.258 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CHGPS AC/CC	CHGP RAD FICRON
1	292.922	13.04583	C.CCCCOCO	-11.48523	C.C	0.0C658
2	292.926	13.04583	C.CCCCOCO	-11.50572	C.C	0.0C658
3	292.937	13.04583	C.CCCCOCO	-11.56605	C.C	0.0C657
4	292.954	13.04583	C.CCCCOCO	-11.65258	C.C	0.0C656
5	292.977	13.04583	C.CCCCOCO	-11.78959	C.C	0.0C655
6	293.005	13.04583	C.CCCCOCO	-11.93963	C.C	0.0C654
7	293.035	13.04583	C.CCCCCCO	-12.10415	C.C	0.0C652
8	293.066	13.04583	C.CCCCOCO	-12.27403	C.C	0.0C651
9	293.097	13.04583	C.CCCCOCO	-12.44026	C.C	0.0C649
10	293.125	13.04583	C.CCCCCCC	-12.59449	C.C	0.0C648
11	293.150	13.04583	C.CCCCOCO	-12.72958	C.C	0.0C647

TIME= 510. SEC PRESSURE= 992.75 MB TOTAL VOLUME= 2070.288 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT CHGPS AC/CC	CHGP RAD FICRON
1	292.936	13.04583	C.CCCCOCO	-11.56231	C.C	0.0C657
2	292.939	13.04583	C.CCCCOCO	-11.58148	C.C	0.0C657
3	292.950	13.04583	C.CCCCOCO	-11.63804	C.C	0.0C657
4	292.966	13.04583	C.CCCCOCO	-11.72857	C.C	0.0C656
5	292.988	13.04583	C.CCCCOCO	-11.84767	C.C	0.0C655
6	293.014	13.04583	C.CCCCOCO	-11.98840	C.C	0.0C653
7	293.042	13.04583	C.CCCCOCO	-12.14272	C.C	0.0C652
8	293.071	13.04583	C.CCCCOCO	-12.30210	C.C	0.0C650
9	293.100	13.04583	C.CCCCOCO	-12.45807	C.C	0.0C649
10	293.127	13.04583	C.CCCCOCO	-12.60280	C.C	0.0C648
11	293.150	13.04583	C.CCCCOCO	-12.72958	C.C	0.0C647

TIME= 520. SEC PRESSURE= 992.75 MB TOTAL VOLUME= 2070.317 CC

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS KG/CC	DROP RAD MICRON
1	292.949	13.04583	C.CCCCCCO	-11.63455		0.0	0.00657
2	292.952	13.04583	C.CCCCCCO	-11.65292		C.0	0.00656
3	292.962	13.04583	C.CCCCCCO	-11.70596		0.0	0.00656
4	292.978	13.04583	C.CCCCCCO	-11.79045		C.0	0.00655
5	292.998	13.04583	C.CCCCCCO	-11.90215		C.0	0.00654
6	293.022	13.04583	C.CCCCCCO	-12.03415		C.C	0.00653
7	293.049	13.04583	C.CCCCCCO	-12.17891		C.C	0.00652
8	293.076	13.04583	C.CCCCCCO	-12.32843		C.0	0.00650
9	293.103	13.04583	C.CCCCCCO	-12.47478		C.0	C.00649
10	293.128	13.04583	C.CCCCCCO	-12.61055		C.C	0.00648
11	293.150	13.04583	C.CCCCCCO	-12.72958		C.0	0.00647

TIME= 530. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.343 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS KG/CC	DROP RAD MICRON
1	292.961	13.04583	C.CCCCCCO	-11.70228		C.0	0.00656
2	292.965	13.04583	C.CCCCCCO	-11.71914		C.0	0.00656
3	292.974	13.04583	C.CCCCCCO	-11.76888		0.0	0.00655
4	292.988	13.04583	C.CCCCCCO	-11.84849		0.0	0.00655
5	293.007	13.04583	C.CCCCCCO	-11.95325		C.0	C.00654
6	293.030	13.04583	C.CCCCCCO	-12.07706		0.C	0.00652
7	293.055	13.04583	C.CCCCCCO	-12.21286		C.0	0.00651
8	293.081	13.04583	C.CCCCCCO	-12.35314		C.0	0.00650
9	293.106	13.04583	C.CCCCCCO	-12.49046		C.0	0.00649
10	293.129	13.04583	C.CCCCCCO	-12.61791		0.0	0.00648
11	293.150	13.04583	C.CCCCCCO	-12.72958		C.0	0.00647

TIME= 540. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.368 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS KG/CC	DROP RAD MICRON
1	292.973	13.04583	C.CCCCCCO	-11.76581		C.0	0.00655
2	292.976	13.04583	C.CCCCCCO	-11.78161		C.0	0.00655
3	292.984	13.04583	C.CCCCCCO	-11.82826		C.0	0.00655
4	292.998	13.04583	C.CCCCCCO	-11.90292		C.0	0.00654
5	293.016	13.04583	C.CCCCCCO	-12.00118		0.C	0.00653
6	293.037	13.04583	C.CCCCCCO	-12.11732		C.0	0.00652
7	293.061	13.04583	C.CCCCCCO	-12.24471		0.0	0.00651
8	293.085	13.04583	C.CCCCCCO	-12.37632		C.C	C.00650
9	293.109	13.04583	C.CCCCCCO	-12.50517		C.C	C.00649
10	293.131	13.04583	C.CCCCCCO	-12.62478		C.0	C.00648
11	293.150	13.04583	C.CCCCCCO	-12.72958		C.0	0.00647

TIME= 550. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.351 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS KG/CC	DROP RAD MICRON
1	292.964	13.04583	C.CCCCCCO	-11.82539		C.0	0.00655
2	292.967	13.04583	C.CCCCCCO	-11.84021		C.0	C.00655
3	292.975	13.04583	C.CCCCCCO	-11.88396		C.C	0.00654
4	293.007	13.04583	C.CCCCCCO	-11.95358		C.0	0.00654
5	293.024	13.04583	C.CCCCCCO	-12.04615		C.0	0.00653
6	293.044	13.04583	C.CCCCCCO	-12.15908		C.0	0.00652
7	293.066	13.04583	C.CCCCCCO	-12.27454		C.0	C.00651
8	293.089	13.04583	C.CCCCCCO	-12.39808		0.C	0.00650
9	293.111	13.04583	C.CCCCCCO	-12.51858		0.0	0.00648
10	293.132	13.04583	C.CCCCCCO	-12.63122		C.C	0.00647
11	293.150	13.04583	C.CCCCCCO	-12.72958		C.0	0.00647

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

TIME= 560. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.433 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	292.994	13.04583	0.CCCCOCO	-11.68127	0.0	0.0C654
2	292.997	13.04583	0.CCCCOCO	-11.89517	0.0	0.0C654
3	293.004	13.04583	0.CCCCOCO	-11.93626	0.0	0.0C654
4	293.010	13.04583	0.CCCCOCO	-12.00187	0.0	0.0C653
5	293.022	13.04583	0.CCCCOCO	-12.08832	0.0	0.0C652
6	293.051	13.04583	0.CCCCOCO	-12.19051	0.0	0.0C651
7	293.071	13.04583	0.CCCCOCO	-12.30263	0.0	0.0C650
8	293.093	13.04583	0.CCCCOCO	-12.41845	0.0	0.0C649
9	293.114	13.04583	0.CCCCOCO	-12.53194	0.0	0.0C648
10	293.133	13.04583	0.CCCCOCO	-12.63727	0.0	0.0C647
11	293.150	13.04583	0.CCCCOCO	-12.72958	0.0	0.0C647

TIME= 570. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.433 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	293.004	13.04583	0.CCCCOCO	-11.93368	0.0	0.0C654
2	293.006	13.04583	0.CCCCOCO	-11.94671	0.0	0.0C654
3	293.013	13.04583	0.CCCCOCO	-11.98519	0.0	0.0C653
4	293.024	13.04583	0.CCCCOCO	-12.04080	0.0	0.0C653
5	293.035	13.04583	0.CCCCOCO	-12.12189	0.0	0.0C652
6	293.057	13.04583	0.CCCCOCO	-12.22375	0.0	0.0C651
7	293.076	13.04583	0.CCCCOCO	-12.32694	0.0	0.0C650
8	293.096	13.04583	0.CCCCOCO	-12.43764	0.0	0.0C649
9	293.116	13.04583	0.CCCCOCO	-12.54410	0.0	0.0C648
10	293.134	13.04583	0.CCCCOCO	-12.64294	0.0	0.0C647
11	293.150	13.04583	0.CCCCOCO	-12.72958	0.0	0.0C647

TIME= 580. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.433 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	293.013	13.04583	0.CCCCOCO	-11.98263	0.0	0.0C653
2	293.015	13.04583	0.CCCCOCO	-11.99506	0.0	0.0C653
3	293.022	13.04583	0.CCCCOCO	-12.03116	0.0	0.0C653
4	293.032	13.04583	0.CCCCOCO	-12.08894	0.0	0.0C652
5	293.046	13.04583	0.CCCCOCO	-12.16500	0.0	0.0C652
6	293.063	13.04583	0.CCCCOCO	-12.25493	0.0	0.0C651
7	293.081	13.04583	0.CCCCOCO	-12.35362	0.0	0.0C650
8	293.099	13.04583	0.CCCCOCO	-12.45562	0.0	0.0C649
9	293.118	13.04583	0.CCCCOCO	-12.55551	0.0	0.0C648
10	293.135	13.04583	0.CCCCOCO	-12.64827	0.0	0.0C647
11	293.150	13.04583	0.CCCCOCO	-12.72958	0.0	0.0C647

TIME= 590. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.471 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DRDPS KG/CC	DROP RAD MICRON
1	293.021	13.04583	0.CCCCOCO	-12.02894	0.0	0.0C653
2	293.023	13.04583	0.CCCCOCO	-12.04041	0.0	0.0C653
3	293.029	13.04583	0.CCCCOCO	-12.07427	0.0	0.0C653
4	293.039	13.04583	0.CCCCOCO	-12.12847	0.0	0.0C652
5	293.052	13.04583	0.CCCCOCO	-12.19982	0.0	0.0C651
6	293.068	13.04583	0.CCCCOCO	-12.28419	0.0	0.0C651
7	293.085	13.04583	0.CCCCOCO	-12.37678	0.0	0.0C650
8	293.103	13.04583	0.CCCCOCO	-12.47248	0.0	0.0C649
9	293.120	13.04583	0.CCCCOCO	-12.56622	0.0	0.0C648

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

10	293.134	13.04583	C.CCCCCCCO	-12.65327	C.C	0.0C647
11	293.150	13.04583	C.CCCCCCCO	-12.72958	0.0	0.0C647

TIME= 600. SEC PRESSURE= 952.75 MB TOTAL VOLUME= 2070.488 CC

J	TEMP DEG K	VAPRAT G/KG	LPXRAT G/KG	SUPERSAT PERCENT	ACT	LWCPS AC/CC	LWCP RAD MICRON
1	293.025	13.04583	C.CCCCCCCO	-12.07220		C.0	0.0C653
2	293.031	13.04983	0.CCCCCCCO	-12.00293		C.0	0.0C652
3	293.037	13.04583	C.CCCCCCCO	-12.11471		C.0	0.0C652
4	293.046	13.04583	C.CCCCCCCO	-12.16555		C.0	0.0C652
5	293.058	13.04983	C.CCCCCCCO	-12.23245		C.0	0.0C651
6	293.073	13.04583	C.CCCCCCCO	-12.31164		C.0	0.0C650
7	293.089	13.04583	C.CCCCCCCO	-12.39591		C.0	0.0C649
8	293.105	13.04583	C.CCCCCCCO	-12.48831		C.0	0.0C649
9	293.122	13.04583	C.CCCCCCCO	-12.57626		C.0	0.0C648
10	293.137	13.04583	C.CCCCCCCO	-12.65746		C.0	0.0C647
11	293.150	13.04583	C.CCCCCCCO	-12.72958		0.0	0.0C647

Figure 3-22. Sample Output of the Non-Adiabatic Expansion Simulation (Cont.)

3.2.3 Static Diffusion Liquid Module

The Static Diffusion Liquid (SDL) Model is designed to simulate the processes of heat and mass transfers, and the cloud droplet formation/evaporation taking place in the chamber. The model itself allows for the control of temperatures of two opposing walls of the chamber. In addition, the simulation can be done for either constant volume or varied pressure. In the case of the SDL experiment, there will be both temperature and mass concentration gradients existing within the chamber. This model subdivides the space within the chamber into a series of grid zones or cells. At present, only one-dimensional microprocesses within and between these cells (in rectangular coordinate system) are considered.

The treatment of cloud physics phenomena remains the same as in the Expansion Chamber.

At the beginning of the experiment, temperatures of the two walls are both assumed to be equal to the initial temperature of chamber. The temperatures of the two walls are varied simultaneously for a specified period of time. Thereafter, both temperatures are held constant until the end of the experiment.

During the total time of experiment, the experiment can be simulated for either the constant volume or varied pressure operation. For the varied pressure case, the SDL Model can be used for simulating the operation of the rapid expansion. With this operation, temperatures of both walls will be held constant, but pressure is allowed to change rapidly.

No need is required for specifying the saturator temperature and pressure for the SDL Model since the gas within the chamber will come to equilibrium with the plates at initial temperature. However, a small modification of the existing SDL Model can be implemented, if such a need occurs.

The input conditions required to use the Static Diffusion Liquid Module are:

1. The thermal accommodation coefficient (ALPHA) and the condensation coefficient (BETA).

2. The initial chamber temperature (TZERO) in ^{o}K, initial pressure (PZERO) in millibars (mb), and the initial expansion rate (DPDT) in mb/sec. (DPDT is negative for an expansion.)

3. The number of classes of aerosol particles (NCLASS) and the reference volume (VZERO) used in the specification of initial particle concentrations. If the particle concentrations are to be specified in number per cubic centimeter, VZERO can be left blank or input, and the model will automatically set it to unity.

4. The distribution of aerosol particles (number concentration) vs. critical supersaturation, in exactly the same manner as given for the Adiabatic Expansion Module.

5. The number of space grid points (NSPACE) used in the module, an index used to define the geometry of the model (KGEOM), and the spacing between grid points (DZ). If the width of the chamber is Z, then NSPACE is equal to Z/DZ+1. That is, the number of grid points is one greater than the number of space intervals because the grid points are defined to be the end point of the cells. The model structure requires NSPACE to be at least 3, but no larger than 21. The input value of KGEOM is Ø for the rectangular geometry used in this model.

6. The clock times at the beginning of the experiment (TMZERO), at the end of the expansion phase (TIMEF), and at the end of the experiment (TIMEND), and the time increment for output points (TIMOUT), all in seconds.

7. The duration of the plate temperature ramp (TMRAMP) in seconds, and the ramp rates of the bottom and top plates (DTW1 and DTW2, respectively) in ^{o}K.

The input stream for the Static Diffusion Liquid Module consists of parameters delineated in Figure 3-23. These parameters are input using punched cards. The format of the data cards is described in Figure 3-24. Note that more than one experiment may be run at the same time by submitting multiple input data sets as described in Section 3.3.

3.2.3.1 Static Diffusion Liquid Experiment Example

An example is given to illustrate the simulation of the Static Diffusion Liquid Experiment. The listing of the input data cards is given in Figure 3-25 with the corresponding output listing shown in Figure 3-26.

Parameters	Units
Experiment name	(Designated name for the Static Diffusion Liquid Experiment)
Thermal accommodation coefficient	
Condensation coefficient	
Initial chamber temperature	degrees K
Initial chamber pressure	millibars
Expansion rate	millibars/second
Number of particle classes	
Reference volume for determining droplet concentration	cubic centimeters
For each class:	
Number of particles	
Critical supersaturation	
Number of grid points	
Geometric configuration	
Grid spacing	centimeters
Start time	seconds
Expansion duration	seconds
Finish time	seconds
Output time increment	seconds
Duration of plate temperature ramp	seconds
Temperature rate change for bottom plate	degrees K/second
Temperature rate change for top plate	degrees K/second

Figure 3-23. Static Diffusion Liquid Module Parameters

CARD #	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment option	A8	SDL EXP
2	1-10	Thermal accommodation coefficient	F10.5	
2	11-20	Condensation coefficient	F10.5	
3	1-10	Initial chamber temperature	F10.5	
3	11-20	Initial chamber pressure	F10.5	
3	21-30	Expansion rate	F10.5	
4	1-5	Number of particle classes - M	I5	Right justified in field
4	6-15	Reference volume	F10.5	The input reference volume is needed only if concentrations are expressed in units other than cc. If initial concentrations are given in no/cc, the program automatically sets this parameter to unity.
I+4	1-10	Number of particles in the Ith class within reference volume	F10.5	
I+4	11-20	Critical supersaturation of the Ith class (I = 1, 2, 3, ...M)		Actual value, not percent
.	.	.	.	
.	.	.	.	
M+4	1-5	Number of grid points	I5	Right justified in field
M+4	6-10	Geometric configuration of the chamber: 0 - Rectangular Coord.	I5	Right justified in field
M+4	11-20	Grid spacing	F10.5	
M+5	1-10	Start time	F10.5	
M+5	11-20	Expansion Duration	F10.5	
M+5	21-30	Finish Time	F10.5	
M+5	31-40	Output time increment	F10.5	
M+6	1-10	Plate temperature ramp duration	F10.5	
M+6	11-20	Bottom plate ramp rate	F10.5	
M+6	21-30	Top plate ramp rate	F10.5	

(F10.5 is standard FORTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-24. Format of Input Data Cards for Static Diffusion Liquid Simulation Run

```
         1         2         3         4         5         6
1234567890123456789012345678901234567890123456789012345678901234567890
SDL EXP
   1.           .03
 293 15    1000.            0.
     6    1.
  50              .002
 200              .004
 250              .006
 250              .008
 200.             .009
  50.             .01
   11      0      .2
   0            0.          50.          5.
  25              .04         -.04
STOP STM
```

Figure 3-25. Input Card Images of Static Diffusion Liquid Experiment Run

INPUT PARAMETERS FOR SDL CHAMBER EXPERIMENT

INITIAL CHAMBER TEMP	293.150	DEG K
INITIAL CHAMBER PRESSURE	1000.000	MB
REFERENCE VOLUME	1.000	CC
EXPANSION RATE	0.0	MB/SEC
EXPANSION DURATION	0.0	SEC
EXPERIMENT DURATION	50.000	SEC
TEMP RAMP DURATION	25.000	SEC
TOP PLATE RAMP RATE	-0.040	DEG/SEC
BOTTOM PLATE RAMP RATE	0.040	DEG/SEC
ACCOMMODATION COEFF	1.000	
CONDENSATION COEFF	0.030	

GRID PARAMETERS
RECTANGULAR COORDINATES
NUMBER OF SPACE POINTS= 11
GRID SPACING = 0.20 CM

INDEX	POSITION	VOLUME	AREA
1	0.0	0.100000 00	0.100000 01
2	0.20000	0.200000 00	0.100000 01
3	0.40000	0.200000 00	0.100000 01
4	0.60000	0.200000 00	0.100000 01
5	0.80000	0.200000 00	0.100000 01
6	1.00000	0.200000 00	0.100000 01
7	1.20000	0.200000 00	0.100000 01
8	1.40000	0.200000 00	0.100000 01
9	1.60000	0.200000 00	0.100000 01
10	1.80000	0.200000 00	0.100000 01
11	2.00000	0.100000 00	

INTEGRATION TIME INCREMENT = 0.063

AEROSOL/DROPLET PARAMETERS

NUMBER OF DROPLET CLASSES= 6

CLASS	NO/CC	CRIT SSAT	CRIT RADIUS	INITIAL RADIUS	A	B
1	50.00	0.00200	0.3695750-04	0.2133760-04	0.1108740-06	0.5048010-16
2	200.00	0.00400	0.1847890-04	0.1066880-04	0.1108740-06	0.1262000-16
3	250.00	0.00800	0.1231930-04	0.7112540-05	0.1108740-06	0.5608900-17
4	250.00	0.01600	0.9239470-05	0.5334410-05	0.1108740-06	0.3155010-17
5	200.00	0.03900	0.6212860-05	0.4741700-05	0.1108740-06	0.2492850-17
6	50.00	0.01000	0.7391570-05	0.4267530-05	0.1108740-06	0.2019210-17

TIME= 5. SEC PRESSURE=1000.00 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	293.350	15.07805	0.0000032	0.00000	0.0	0.21344
2	293.301	15.03454	0.0000033	0.02100	0.0	0.21792
3	293.258	14.99362	0.0000033	0.02111	0.0	0.21790
4	293.220	14.95645	0.0000033	0.01723	0.0	0.21699
5	293.184	14.92179	0.0000033	0.01073	0.0	0.21553
6	293.150	14.88842	0.0000032	0.00280	0.0	0.21385
7	293.116	14.85508	0.0000031	-0.00522	0.0	0.21221
8	293.081	14.82055	0.0000031	-0.01216	0.0	0.21064
9	293.042	14.78360	0.0000031	-0.01693	0.0	0.20994
10	292.999	14.74299	0.0000031	-0.01854	0.0	0.20967
11	292.950	14.69983	0.0000032	-0.00000	0.0	0.21331

Figure 3-26. Sample Output of the Static Diffusion Liquid Experiment Simulation

```
DROP RADIUS SPECTRUM
 J=     1      2      3      4      5      6      7      8      9     10     11
      0.213  0.219  0.218  0.217  0.216  0.215  0.212  0.211  0.213  0.214  0.213
      0.107  0.108  0.108  0.108  0.107  0.107  0.106  0.106  0.106  0.106  0.107
      0.071  0.072  0.072  0.072  0.071  0.071  0.071  0.071  0.071  0.071  0.071
      0.053  0.054  0.054  0.054  0.053  0.053  0.053  0.053  0.053  0.053  0.053
      0.047  0.048  0.048  0.048  0.048  0.047  0.047  0.047  0.047  0.047  0.047
      0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043

TIME=  10. SEC          PRESSURE=1000.01 MB          TOTAL VOLUME=     2.000 CC

  J     TEMP      VMXRAT     LMXRAT    SUPERSAT ACT   DROPS    DROP RAD
        DEG K      G/KG       G/KG      PERCENT       NO/CC     MICRON
  1   293.550   15.27038   0.0000032   0.00000        0.0      0.21352
  2   293.461   15.18880   0.0000033   0.02649        0.0      0.21917
  3   293.376   15.10995   0.0000034   0.03062        0.0      0.22000
  4   293.300   15.03471   0.0000034   0.02945        0.0      0.21952
  5   293.224   14.96214   0.0000034   0.02455        0.0      0.21840
  6   293.151   14.89091   0.0000033   0.01722        0.0      0.21671
  7   293.077   14.81976   0.0000032   0.00873        0.0      0.21480
  8   293.001   14.74751   0.0000032   0.00025        0.0      0.21311
  9   292.922   14.67200   0.0000031  -0.00721        0.0      0.21165
 10   292.835   14.59464   0.0000031  -0.01274        0.0      0.21063
 11   292.750   14.51389   0.0000032  -0.00000        0.0      0.21324

DROP RADIUS SPECTRUM
 J=     1      2      3      4      5      6      7      8      9     10     11
      0.214  0.219  0.220  0.220  0.219  0.217  0.215  0.213  0.212  0.211  0.213
      0.107  0.108  0.108  0.108  0.108  0.108  0.107  0.107  0.106  0.106  0.107
      0.071  0.072  0.072  0.072  0.072  0.072  0.071  0.071  0.071  0.071  0.071
      0.053  0.054  0.054  0.054  0.054  0.054  0.053  0.053  0.053  0.053  0.053
      0.047  0.048  0.048  0.048  0.048  0.048  0.047  0.047  0.047  0.047  0.047
      0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043

TIME=  15. SEC          PRESSURE=1000.01 MB          TOTAL VOLUME=     2.000 CC

  J     TEMP      VMXRAT     LMXRAT    SUPERSAT ACT   DROPS    DROP RAD
        DEG K      G/KG       G/KG      PERCENT       NO/CC     MICRON
  1   293.750   15.46463   0.0000032   0.00000        0.0      0.21359
  2   293.621   15.34523   0.0000035   0.03661        0.0      0.22158
  3   293.499   15.22827   0.0000036   0.04846        0.0      0.22434
  4   293.380   15.11516   0.0000036   0.05278        0.0      0.22526
  5   293.265   15.00468   0.0000036   0.05116        0.0      0.22469
  6   293.151   14.89559   0.0000035   0.04506        0.0      0.22302
  7   293.037   14.78665   0.0000034   0.03571        0.0      0.22069
  8   292.921   14.67663   0.0000033   0.02419        0.0      0.21802
  9   292.803   14.56429   0.0000032   0.01136        0.0      0.21527
 10   292.679   14.44840   0.0000031  -0.00206        0.0      0.21260
 11   292.550   14.33002   0.0000032   0.00000        0.0      0.21316

DROP RADIUS SPECTRUM
 J=     1      2      3      4      5      6      7      8      9     10     11
      0.214  0.222  0.224  0.225  0.225  0.223  0.221  0.218  0.215  0.213  0.213
      0.107  0.109  0.109  0.110  0.109  0.109  0.109  0.108  0.107  0.106  0.107
      0.071  0.072  0.072  0.072  0.072  0.072  0.072  0.072  0.071  0.071  0.071
      0.053  0.054  0.054  0.054  0.054  0.054  0.054  0.054  0.053  0.053  0.053
      0.047  0.048  0.048  0.048  0.048  0.048  0.048  0.046  0.048  0.047  0.047
      0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043  0.043

TIME=  20. SEC          PRESSURE=1000.02 MB          TOTAL VOLUME=     2.000 CC
```

Figure 3-26. Sample Output of the Static Diffusion Liquid Experiment Simulation (Cont.)

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS NO/CC	DROP RAD MICRON
1	293.950	15.66147	0.0000032	0.00000		0.0	0.21366
2	293.782	15.50365	0.0000036	0.05129		0.0	0.22533
3	293.619	15.34989	0.0000038	0.07454		0.0	0.23156
4	293.461	15.19782	0.0000040	0.08702		0.0	0.23515
5	293.306	15.04943	0.0000040	0.09056		0.0	0.23607
6	293.152	14.90247	0.0000039	0.08843		0.0	0.23447
7	292.998	14.75570	0.0000038	0.07989		0.0	0.23114
8	292.842	14.60791	0.0000036	0.06938		0.0	0.22666
9	292.683	14.45784	0.0000034	0.05760		0.0	0.22137
10	292.520	14.30425	0.0000033	0.04382		0.0	0.21576
11	292.350	14.14620	0.0000032	0.00000		0.0	0.21003

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.225	0.232	0.235	0.236	0.234	0.231	0.227	0.221	0.216	0.213
	0.107	0.110	0.111	0.112	0.112	0.112	0.111	0.110	0.109	0.107	0.107
	0.071	0.072	0.073	0.073	0.073	0.073	0.073	0.073	0.072	0.071	0.071
	0.053	0.054	0.054	0.055	0.055	0.055	0.054	0.054	0.054	0.053	0.053
	0.047	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.047
	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043

TIME= 25. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS NO/CC	DROP RAD MICRON
1	294.150	15.86031	0.0000032	0.00000		0.0	0.21373
2	293.942	15.66469	0.0000036	0.07041		0.0	0.23073
3	293.740	15.47172	0.0000043	0.10871		0.0	0.24315
4	293.542	15.28270	0.0000046	0.13224		0.0	0.25036
5	293.347	15.09838	0.0000048	0.14265		0.0	0.25472
6	293.153	14.91154	0.0000048	0.14133		0.0	0.25564
7	292.959	14.72094	0.0000045	0.12935		0.0	0.24997
8	292.763	14.54134	0.0000042	0.10745		0.0	0.24129
9	292.564	14.35350	0.0000038	0.07601		0.0	0.23108
10	292.360	14.16215	0.0000034	0.03503		0.0	0.22042
11	292.150	13.96843	0.0000032	0.00001		0.0	0.21302

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.231	0.243	0.252	0.257	0.256	0.250	0.241	0.231	0.220	0.213
	0.107	0.111	0.113	0.115	0.116	0.115	0.114	0.113	0.111	0.108	0.107
	0.071	0.073	0.074	0.075	0.075	0.075	0.074	0.074	0.073	0.072	0.071
	0.053	0.054	0.055	0.055	0.055	0.055	0.055	0.055	0.054	0.054	0.053
	0.047	0.048	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.048	0.047
	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.043	0.043

TIME= 30. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT	DROPS NO/CC	DROP RAD MICRON
1	294.150	15.86027	0.0000032	-0.00000		0.0	0.21374
2	293.951	15.67139	0.0000037	0.05799		0.0	0.22764
3	293.752	15.48244	0.0000043	0.10409		0.0	0.24302
4	293.552	15.29341	0.0000049	0.13796		0.0	0.25491
5	293.352	15.10432	0.0000055	0.15924		0.0	0.27236
6	293.153	14.91516	0.0000057	0.16757		0.0	0.27843
7	292.952	14.72593	0.0000055	0.16253		0.0	0.27406
8	292.752	14.53664	0.0000050	0.14369		0.0	0.26130
9	292.552	14.34728	0.0000043	0.11000		0.0	0.24435

Figure 3-26. Sample Output of the Static Diffusion Liquid Experiment Simulation (Cont.)

10	292.351	14.15785	0.0000037	0.06278	0.0	0.22624
11	292.150	13.96838	0.0000032	0.00002	0.0	0.21302

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.228	0.243	0.259	0.272	0.279	0.274	0.261	0.245	0.228	0.213
	0.107	0.110	0.113	0.115	0.117	0.118	0.117	0.116	0.113	0.110	0.107
	0.071	0.073	0.074	0.075	0.075	0.076	0.075	0.075	0.074	0.073	0.071
	0.053	0.054	0.055	0.055	0.056	0.056	0.056	0.055	0.055	0.054	0.053
	0.047	0.048	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.047
	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.043

TIME= 35. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	294.150	15.86027	0.0000032	0.00000	0.0	0.21374
2	293.951	15.67144	0.0000037	0.05845	0.0	0.22762
3	293.752	15.48254	0.0000043	0.10497	0.0	0.24358
4	293.552	15.29355	0.0000049	0.13919	0.0	0.26026
5	293.352	15.10447	0.0000056	0.16071	0.0	0.27527
6	293.152	14.91532	0.0000059	0.16913	0.0	0.28264
7	292.952	14.72605	0.0000057	0.16402	0.0	0.27764
8	292.752	14.53678	0.0000053	0.14498	0.0	0.26314
9	292.552	14.34738	0.0000043	0.11155	0.0	0.24555
10	292.351	14.15790	0.0000037	0.06328	0.0	0.22645
11	292.150	13.96838	0.0000032	0.00002	0.0	0.21302

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.228	0.244	0.260	0.275	0.283	0.278	0.263	0.246	0.228	0.213
	0.107	0.110	0.113	0.115	0.117	0.118	0.117	0.116	0.113	0.110	0.107
	0.071	0.073	0.074	0.075	0.075	0.076	0.075	0.075	0.074	0.073	0.071
	0.053	0.054	0.055	0.055	0.056	0.056	0.056	0.055	0.055	0.054	0.053
	0.047	0.048	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.047
	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.043

TIME= 40. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	294.150	15.86027	0.0000032	0.00000	0.0	0.21374
2	293.951	15.67145	0.0000037	0.05846	0.0	0.22763
3	293.752	15.48254	0.0000043	0.10502	0.0	0.24361
4	293.552	15.29355	0.0000049	0.13926	0.0	0.26037
5	293.352	15.10448	0.0000056	0.16079	0.0	0.27552
6	293.152	14.91534	0.0000059	0.16921	0.0	0.28313
7	292.952	14.72610	0.0000057	0.16410	0.0	0.27795
8	292.752	14.53678	0.0000053	0.14505	0.0	0.26325
9	292.552	14.34739	0.0000043	0.11160	0.0	0.24559
10	292.351	14.15791	0.0000037	0.06331	0.0	0.22646
11	292.150	13.96838	0.0000032	0.00002	0.0	0.21302

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.228	0.244	0.260	0.276	0.283	0.278	0.263	0.246	0.228	0.213
	0.107	0.110	0.113	0.115	0.117	0.118	0.117	0.116	0.113	0.110	0.107
	0.071	0.073	0.074	0.075	0.075	0.076	0.075	0.075	0.074	0.073	0.071
	0.053	0.054	0.055	0.055	0.056	0.056	0.056	0.055	0.055	0.054	0.053
	0.047	0.048	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.047
	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.043

Figure 3-26. Sample Output of the Static Diffusion Liquid Experiment Simulation (Cont.)

TIME= 45. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMRAT G/KG	LMRAT G/KG	SUPERSAT PERCENT	ACT DROPS NO/CC	DROP RAD MICRON
1	294.150	15.86027	0.0000032	0.00000	0.0	0.21374
2	293.951	15.67145	0.0000037	0.05848	0.0	0.22783
3	293.752	15.48254	0.0000043	0.10503	0.0	0.24361
4	293.552	15.29355	0.0000049	0.13926	0.0	0.26037
5	293.352	15.10448	0.0000056	0.16079	0.0	0.27953
6	293.152	14.91533	0.0000059	0.16921	0.0	0.28316
7	292.952	14.72610	0.0000057	0.16411	0.0	0.27797
8	292.752	14.53678	0.0000050	0.14505	0.0	0.26326
9	292.552	14.34739	0.0000043	0.11160	0.0	0.24559
10	292.351	14.15791	0.0000037	0.06331	0.0	0.22846
11	292.150	13.96836	0.0000032	0.00002	0.0	0.21342

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.228	0.244	0.263	0.276	0.283	0.278	0.263	0.246	0.226	0.213
	0.107	0.110	0.113	0.115	0.117	0.118	0.117	0.116	0.113	0.110	0.107
	0.071	0.073	0.074	0.075	0.075	0.076	0.075	0.075	0.074	0.073	0.071
	0.053	0.054	0.055	0.055	0.056	0.056	0.056	0.055	0.055	0.054	0.053
	0.047	0.048	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.047
	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.043

TIME= 50. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMRAT G/KG	LMRAT G/KG	SUPERSAT PERCENT	ACT DROPS NO/CC	DROP RAD MICRON
1	294.150	15.86027	0.0000032	0.00000	0.0	0.21374
2	293.951	15.67145	0.0000037	0.05848	0.0	0.22783
3	293.752	15.48254	0.0000043	0.10503	0.0	0.24361
4	293.552	15.29355	0.0000049	0.13926	0.0	0.26037
5	293.352	15.10448	0.0000056	0.16079	0.0	0.27953
6	293.152	14.91533	0.0000059	0.16921	0.0	0.28316
7	292.952	14.72610	0.0000057	0.16411	0.0	0.27797
8	292.752	14.53678	0.0000050	0.14505	0.0	0.26326
9	292.552	14.34739	0.0000043	0.11160	0.0	0.24559
10	292.351	14.15791	0.0000037	0.06331	0.0	0.22846
11	292.150	13.96836	0.0000032	0.00002	0.0	0.21342

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.214	0.228	0.244	0.263	0.276	0.283	0.278	0.263	0.246	0.226	0.213
	0.107	0.110	0.113	0.115	0.117	0.118	0.117	0.116	0.113	0.110	0.107
	0.071	0.073	0.074	0.075	0.075	0.076	0.075	0.075	0.074	0.073	0.071
	0.053	0.054	0.055	0.055	0.056	0.056	0.056	0.055	0.055	0.054	0.053
	0.047	0.048	0.049	0.049	0.049	0.049	0.049	0.049	0.049	0.048	0.047
	0.043	0.043	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.043	0.043

* END SIMULATION *

Figure 3-26. Sample Output of the Static Diffusion Liquid Experiment Simulation (Cont.)

3.2.4 Continuous Flow Diffusion (CFD) Module

The CFD Model is designed to simulate a controlled environment where a single variable (pressure (P), temperature (T), supersaturation) can be varied independently for the purpose of studying nucleation and early droplet growth characteristics which occur in clouds, fogs, and smogs. The model itself simulates a thermal and vapor diffusion phenomena taking place between the two, parallel, partially-wet plates. A temperature difference is maintained between these plates. The resulting diffusion of heat and water vapor from the warmer toward the colder surface produces linear temperature and vapor pressure gradients. Because the saturation vapor pressure versus temperature curve (water in air) is nonlinear, the actual water vapor pressure exceeds the saturation vapor pressure resulting in a supersaturation near the midpoint between the plates. Thus, the relative humidity (supersaturation) within the CFD experiment is controlled by the temperatures of the two parallel plates.

The major features to be simulated can be summarized as follows. The aerosol is centrally injected at a short distance from the wet/wet section of the chamber. With different ranges of discrete carrier flows and injected aerosol settings, flexibility of the experiment can be maintained. The temperatures of the two plates are ramped symmetrically about the peak supersaturation point to minimize the transient supersaturations and to enhance data reduction. Each plate temperature can also be programmed individually.

The existing model as developed for Phase I is basically a two-dimensional steady-state one. The flow of the gas within the CFD Chamber is at present assumed to have the velocity profile of parabolic function. (The flow model of the fluid within the CFD Chamber is being developed in a separate sub-task. This flow model will be integrated into the CFD Model for computing the velocity and pressure profiles within the chamber. The integration of the fluid model is expected to be implemented in Phase II.) However, this model considers heat conduction and vapor diffusion in both x-direction (parallel to the flow) and z-direction (perpendicular to the flow and between the upper and lower plates).

The input conditions required to use the CFD Module are:

1. The thermal accommodation coefficient (ALPHA) and the condensation coefficient (BETA).

2. The aerosol distribution name (ADIST).

3. The number of classes of aerosol particles (NCLASS).

4. For a user generated aerosol distribution: the distribution of aerosol particle number concentration (NZERO) vs. critical supersaturation (SIGMAC), in exactly the same manner as given for the adiabatic expansion module,

   or

   For the CxS^K aerosol distribution function where S is critical supersaturation: the total number of particles per CC in the aerosol (ANBAR), the value of the exponent K in the distribution (AK), the lower bound on the supersaturation (SMIN), and the upper bound on the supersaturation (SMAX).

5. The CFD Chamber length (CFDLEN), the CFD plate spacing (CFDHT), the CFD Chamber width (CFDWID), and the length of sample injection slit (SLITLN).

6. The distance from chamber entrance to start of wet-dry zone (start of wick surface on bottom plate, XWTDRY), the distance to start of wet-wet zone (XWTWT), and the distance of sample injection point (XINJ).

7. The initial chamber temperature (TZERO) in degrees K, initial pressure (PZERO) in millibars (MB), the top plate temperature (TW1), and the bottom plate temperature (TW2).

8. The number of space grid points (NSPACE) used in the module, the saturator temperature for carrier gas flow (TSATUR), the saturator pressure for carrier gas flow (PSATUR), and the volume flow rate of carrier gas (CFLOW).

9. The number of grid points used for sample gas flow (NSAMPL), the sample gas temperature at injection point (TSAMPL), and the sample gas dew point temperature (TDSMPL).

10. The space increment in flow direction for integration of model equations (DX), and the space increment at which output is desired (DXOUT).

The input stream for the Continuous Flow Diffusion Module consists of parameters delineated in Figure 3-27. These parameters are input using punched cards. The format of the data cards is described in Figures 3-28 and 3-29. Note that more than one experiment may be run at the same time by submitting multiple input data sets as described in paragraph 3.3.

3.2.4.1 Continuous Flow Diffusion Experiment Example

Examples are given to illustrate the simulation of the Continuous Flow Diffusion Experiment. The listings of the input data cards are given in Figures 3-30 and 3-32. The corresponding output listings are shown in Figures 3-31 and 3-33.

Parameters	Units
Experiment Name	(Designated name for the Continuous Flow Diffusion Experiment)
Thermal accommodation coefficient	
Condensation coefficient	
Aerosol distribution name	
Number of particle classes for each class:	
Number of particles	
Critical supersaturation	
Number of particles	
Exponent (K)	
Lower bound on supersaturation	
Upper bound on supersaturation	
CFD chamber length	CM
CFD plate spacing	CM
CFD chamber width	CM
Length of sample injection slit	CM
Distance from chamber entrance to start of wet-dry zone	CM
Distance to start of wet-wet zone	CM
Distance to sample injection point	CM
Initial chamber temperature	Degrees K
Initial chamber pressure	Millibars
Top plate temperature	Degrees K
Bottom plate temperature	Degrees K
Number of grid points for carrier gas flow	
Saturator temperature	Degrees K
Saturator pressure	Millibars
Volume flow rate for carrier gas	CC
Number of grid points for sample gas flow	
Sample gas temperature at injection point	Degrees K
Sample gas dew point temperature at injection point	Degrees K
Space increment in flow direction for integration of equations	CM
Space increment for output	CM

Figure 3-27. Input conditions for Continuous Flow Diffusion Module

CARD #	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment option	A8	CFD EXP
2	1-10	Thermal accommodation coefficient	F10.5	
2	11-20	Condensation coefficient	F10.5	
3	1-8	Aerosol distribution name	A8	C*S TO K
4	1-5	Number of particle classes	I5	Right justified in field
5	1-10	Total number of particles per CC in the aerosol	F10.5	
5	11-20	Value of the Exponent K in the distribution	F10.5	
5	21-30	Lower bound on the supersaturation	F10.5	
5	31-40	Upper bound on the supersaturation	F10.5	
6	1-10	CFD chamber length	F10.5	
6	11-20	CFD plate spacing	F10.5	
6	21-30	CFD chamber width	F10.5	
6	31-40	Length of sample injection slit	F10.5	
7	1-10	Distance from chamber entrance to start of wet-dry zone	F10.5	
7	11-20	Distance to start of wet-wet zone	F10.5	
7	21-30	Distance to sample injection point	F10.5	
8	1-10	Initial chamber temperature	F10.5	
8	11-20	Initial chamber pressure	F10.5	
8	21-30	Top plate temperature	F10.5	
8	31-40	Bottom plate temperature	F10.5	
9	1-10	Number of grid points used for carrier gas flow	I10	
9	11-20	Saturator temperature	F10.5	
9	21-30	Saturator pressure	F10.5	
9	31-40	Volume flow rate of carrier gas	F10.5	
10	1-10	Number of grid points used for sample gas flow	I10	
10	11-20	Sample gas temperature at injection point	F10.5	
10	21-30	Sample gas dew point temperature	F10.5	
11	1-10	Space increment in flow direction for integration of model equations	F10.5	
11	11-20	Space increment at which output is desired	F10.5	

(F10.5 is standard FORTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-28. Format of Input Data Cards for Continuous Flow Diffusion Simulation Run with CxS^K Aerosol Distribution

CARD #	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment option	A8	CFD EXP
2	1-10	Thermal accommodation coefficient	F10.5	
2	11-20	Condensation coefficient	F10-5	
3	1-8	Aerosol distribution name	A8	N VS $C
4	1-5	Number of particle classes - M	I5	Right justified in field
I+4	1-10	Number of particles in the Ith class	F10.5	
I+4	11-20	Critical supersaturation of the Ith class (I = 1, 2, 3, . . ., M)		Actual value, not percent
M+5	1-10	CFD chamber length	F10.5	
M+5	11-20	CFD plate spacing	F10.5	
M+5	21-30	CFD chamber width	F10.5	
M+5	31-40	Length of sample injection slit	F10.5	
M+6	1-10	Distance from chamber entrance to start of wet-dry zone	F10.5	
M+6	11-20	Distance to start of wet-wet zone	F10.5	
M+6	21-30	Distance to sample injection point	F10.5	
M+7	1-10	Initial chamber temperature	F10.5	
M+7	11-20	Initial chamber pressure	F10.5	
M+7	21-30	Top plate temperature	F10.5	
M+7	31-40	Bottom plate temperature	F10.5	
M+8	1-10	Number of grid points used for carrier gas flow	I10	Right justified in field
M+8	11-20	Saturator temperature	F10.5	
M+8	21-30	Saturator pressure	F10.5	
M+8	31-40	Volume flow rate of carrier gas	F10.5	
M+9	1-10	Number of grid points used for sample gas flow	I10	Right justified in field
M+9	11-20	Sample gas temperature at injection point	F10.5	
M+9	21-30	Sample gas dew point temperature	F10.5	
M+10	1-10	Space increment in flow direction for integration of model equations	F10.5	
M+10	11-20	Space increment at which output is desired	F10.5	

(F10.5 is standard FORTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-29. Format of Input Data Cards for Continuous Flow Diffusion Simulation Run with User-Defined Aerosol Distribution

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
CFD EXP
   1.           .03
C*S TO K
   20
  500.          1.           .002       .01
   66.          2.          36.         12.
    3.          6.          15.
  293.15    1000.         295.15     291.15
         30 291.15    1000.          50.
          3 293.15     291.15
     .0625    11.
STOP SIM
```

Figure 3-30. Input Card Images of Continuous Flow Diffusion Experiment Run - Example 1

INPUT PARAMETERS FOR CFD EXPERIMENT

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=30

INDEX	POSITION	VOLUME	AREA
1	0.0	0.344830-01	0.100000 01
2	0.06897	0.689660-01	0.100000 01
3	0.13793	0.689660-01	0.100000 01
4	0.20690	0.689660-01	0.100000 01
5	0.27586	0.689660-01	0.100000 01
6	0.34483	0.689660-01	0.100000 01
7	0.41379	0.689660-01	0.100000 01
8	0.48276	0.689660-01	0.100000 01
9	0.55172	0.689660-01	0.100000 01
10	0.62069	0.689660-01	0.100000 01
11	0.68966	0.689660-01	0.100000 01
12	0.75862	0.689660-01	0.100000 01
13	0.82759	0.689660-01	0.100000 01
14	0.89655	0.689660-01	0.100000 01
15	0.96552	0.689660-01	0.100000 01
16	1.03448	0.689660-01	0.100000 01
17	1.10345	0.689660-01	0.100000 01
18	1.17241	0.689660-01	0.100000 01
19	1.24138	0.689660-01	0.100000 01
20	1.31034	0.689660-01	0.100000 01
21	1.37931	0.689660-01	0.100000 01
22	1.44828	0.689660-01	0.100000 01
23	1.51724	0.689660-01	0.100000 01
24	1.58621	0.689660-01	0.100000 01
25	1.65517	0.689660-01	0.100000 01
26	1.72414	0.689660-01	0.100000 01
27	1.79310	0.689660-01	0.100000 01
28	1.86207	0.689660-01	0.100000 01
29	1.93103	0.689660-01	0.100000 01
30	2.00000	0.344830-01	

CFD CHAMBER LENGTH	66.000 CM
CFD CHAMBER WIDTH	36.000 CM
PLATE SPACING	2.000 CM
INJECTION SLIT LENGTH	12.000 CM
START OF WET-DRY ZONE	3.000 CM
START OF WET-WET ZONE	6.000 CM
TOP PLATE TEMPERATURE	295.150 DEG K
BOTTOM PLATE TEMPERATURE	291.150 DEG K
SATURATOR TEMPERATURE	291.150 DEG K
SATURATOR PRESSURE	1000.000 MB
CARRIER GAS FLOW RATE	50.000 CC/SEC
INITIAL GAS TEMPERATURE	293.150 DEG K
CHAMBER PRESSURE	1000.000 MB
INITIAL SUPERSATURATION	-11.752 PERCENT
HORIZONTAL INCREMENT	0.033 CM
OUTPUT SPACE INCREMENT	11.000 CM
SAMPL INJECTION POINT	15.000 CM

OUTPUT AT X=11.00 CM

INDEX	TEMP	VMXRAT	SUPERSAT

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1

	DEG K	G/KG	PERCENT
1	295.150	16.89131	-0.00000
2	295.013	16.75651	0.03347
3	294.877	16.61395	0.06143
4	294.740	16.47545	0.08399
5	294.603	16.33737	0.10145
6	294.466	16.19893	0.11420
7	294.329	16.06086	0.12280
8	294.191	15.92327	0.12764
9	294.054	15.78619	0.13001
10	293.917	15.64975	0.13003
11	293.779	15.51405	0.12801
12	293.642	15.37920	0.12643
13	293.504	15.24530	0.12408
14	293.366	15.11243	0.12210
15	293.228	14.98062	0.12085
16	293.090	14.84992	0.12057
17	292.952	14.72032	0.12133
18	292.814	14.59180	0.12304
19	292.676	14.46431	0.12541
20	292.538	14.33777	0.12801
21	292.399	14.21210	0.13024
22	292.261	14.08719	0.13139
23	292.122	13.96291	0.13065
24	291.984	13.83916	0.12714
25	291.845	13.71580	0.11995
26	291.706	13.59272	0.10818
27	291.567	13.46982	0.09100
28	291.428	13.34701	0.06763
29	291.289	13.22421	0.03745
30	291.150	13.10140	-0.00000

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=33

INDEX	POSITION	VOLUME	AREA
1	0.0	0.312500D-01	0.100000D 01
2	0.06250	0.625000D-01	0.100000D 01
3	0.12500	0.625000D-01	0.100000D 01
4	0.18750	0.625000D-01	0.100000D 01
5	0.25000	0.625000D-01	0.100000D 01
6	0.31250	0.625000D-01	0.100000D 01
7	0.37500	0.625000D-01	0.100000D 01
8	0.43750	0.625000D-01	0.100000D 01
9	0.50000	0.625000D-01	0.100000D 01
10	0.56250	0.625000D-01	0.100000D 01
11	0.62500	0.625000D-01	0.100000D 01
12	0.68750	0.625000D-01	0.100000D 01
13	0.75000	0.625000D-01	0.100000D 01
14	0.81250	0.625000D-01	0.100000D 01
15	0.87500	0.625000D-01	0.100000D 01
16	0.93750	0.625000D-01	0.100000D 01
17	1.00000	0.625000D-01	0.100000D 01
18	1.06250	0.625000D-01	0.100000D 01
19	1.12500	0.625000D-01	0.100000D 01
20	1.18750	0.625000D-01	0.100000D 01
21	1.25000	0.625000D-01	0.100000D 01
22	1.31250	0.625000D-01	0.100000D 01
23	1.37500	0.625000D-01	0.100000D 01

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

24	1.43750	0.625000-01	0.100000 01
25	1.50000	0.625000-01	0.100000 01
26	1.56250	0.625000-01	0.100000 01
27	1.62500	0.625000-01	0.100000 01
28	1.68750	0.625000-01	0.100000 01
29	1.75000	0.625000-01	0.100000 01
30	1.81250	0.625000-01	0.100000 01
31	1.87500	0.625000-01	0.100000 01
32	1.93750	0.625000-01	0.100000 01
33	2.00000	0.312500-01	

AEROSOL/DROPLET PARAMETERS

ACCOMMODATION COEFF 1.000
CONDENSATION COEFF 0.030

NUMBER OF DROPLET CLASSES= 20

CLASS	NO/CC	CRIT SSAT	CRIT RADIUS	INIT RADIUS	A	B
1	25.00	0.00240	0.29857D-04	0.61865C-05	0.10749D-06	0.31540D-16
2	25.00	0.00280	0.25552D-04	0.55554C-05	0.10749D-06	0.23466D-16
3	25.00	0.00320	0.22393D-04	0.50589C-05	0.10749D-06	0.17966D-16
4	25.00	0.00360	0.19950D-04	0.46564C-05	0.10749D-06	0.14196D-16
5	25.00	0.00400	0.17914D-04	0.43224D-05	0.10749D-06	0.11498D-16
6	25.00	0.00440	0.16266D-04	0.40399D-05	0.10749D-06	0.95029D-17
7	25.00	0.00480	0.14929D-04	0.37974D-05	0.10749D-06	0.79850D-17
8	25.00	0.00520	0.13780D-04	0.35864D-05	0.10749D-06	0.68038D-17
9	25.00	0.00560	0.12796D-04	0.34010C-05	0.10749D-06	0.58666D-17
10	25.00	0.00600	0.11943D-04	0.32366D-05	0.10749D-06	0.51104D-17
11	25.00	0.00640	0.11197D-04	0.30895C-05	0.10749D-06	0.44916D-17
12	25.00	0.00680	0.10538D-04	0.29571C-05	0.10749D-06	0.39787D-17
13	25.00	0.00720	0.99525D-05	0.28371D-05	0.10749D-06	0.35489D-17
14	25.00	0.00760	0.94287D-05	0.27278C-05	0.10749D-06	0.31852D-17
15	25.00	0.00800	0.89572D-05	0.26278D-05	0.10749D-06	0.28746D-17
16	25.00	0.00840	0.85307D-05	0.25358D-05	0.10749D-06	0.26074D-17
17	25.00	0.00880	0.81429D-05	0.24509C-05	0.10749D-06	0.23757D-17
18	25.00	0.00920	0.77889D-05	0.23722D-05	0.10749D-06	0.21736D-17
19	25.00	0.00960	0.74644D-05	0.22991C-05	0.10749D-06	0.19963D-17
20	25.00	0.01000	0.71658D-05	0.22309C-05	0.10749D-06	0.18398D-17

TOTAL SAMPLE GAS FLOW 2.730 CC/SEC
TOTAL PARTICLE FLUX 1365.124 NC/SEC

OUTPUT AT X=22.00 CM

INDEX	TEMP DEG K	VMXRAT G/KG	SUPERSAT PERCENT	LPXRAT G/KG	DROP CONC NC/CC
1	295.150	16.89131	-0.00000		
2	295.026	16.77232	0.07018		
3	294.902	16.65359	0.13639		
4	294.778	16.53484	0.19858		
5	294.654	16.41636	0.25669		
6	294.530	16.29727	0.31066		
7	294.406	16.17847	0.36046		
8	294.281	16.05967	0.40606		
9	294.157	15.94087	0.44741		
10	294.033	15.82209	0.48451		
11	293.908	15.70333	0.51730		
12	293.784	15.58461	0.54577		
13	293.659	15.46593	0.56988		
14	293.534	15.34729	0.58959		
15	293.409	15.22872	0.60485		

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

16	294.264	15.11320	0.62182	0.0000963	225.000
17	293.160	14.99174	0.62182	0.0000982	225.000
18	293.034	14.87334	0.62342	0.0000985	225.000
19	292.909	14.75531	0.62032		
20	292.784	14.63674	0.61236		
21	292.659	14.51552	0.59642		
22	292.534	14.40035	0.58138		
23	292.409	14.28223	0.55808		
24	292.283	14.16413	0.52536		
25	292.157	14.04637	0.49511		
26	292.032	13.92931	0.49511		
27	291.906	13.80977	0.40920		
28	291.780	13.69152	0.35720		
29	291.654	13.57356	0.29895		
30	291.528	13.45575	0.23427		
31	291.402	13.33759	0.18259		
32	291.276	13.21956	0.08495		
33	291.150	13.10140	-0.00000		

DROPLET RADIUS SPECTRUM

J=	16	17	18
	0.714	0.716	0.716
	0.643	0.643	0.643
	0.567	0.571	0.571
	0.493	0.497	0.495
	0.415	0.421	0.422
	0.335	0.342	0.343
	0.255	0.262	0.263
	0.185	0.191	0.192
	0.137	0.141	0.141
	0.110	0.112	0.112
	0.095	0.096	0.096
	0.084	0.085	0.085
	0.077	0.077	0.077
	0.070	0.071	0.071
	0.065	0.066	0.066
	0.061	0.061	0.061
	0.057	0.058	0.058
	0.054	0.054	0.054
	0.051	0.051	0.051
	0.049	0.049	0.049

OUTPUT AT X=33.00 CM

INDEX	TEMP DEG K	VMXRAT G/KG	SUPERSAT PERCENT	LMXRAT G/KG	DROP CONC NC/CC
1	295.150	16.89101	-0.00000		
2	295.026	16.77302	0.07335		
3	294.903	16.65500	0.14279		
4	294.779	16.53694	0.20824		
5	294.655	16.41886	0.26962		
6	294.531	16.30074	0.32683		
7	294.407	16.18259	0.37980		
8	294.283	16.06441	0.42844		
9	294.158	15.94620	0.47264		
10	294.034	15.82795	0.51232		
11	293.910	15.70967	0.54739		
12	293.785	15.59136	0.57774		
13	293.661	15.47302	0.60328		
14	293.536	15.35464	0.62391		
15	293.412	15.23623	0.63953		
16	293.287	15.11779	0.65003	0.0127193	275.000

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

17	293.102	14.99936	0.65642	0.0129653	275.000
18	293.037	14.88094	0.65862	0.0130326	275.000
19	292.972	14.76254	0.65656		
20	292.780	14.64411	0.64856		
21	292.661	14.52564	0.63580		
22	292.535	14.40713	0.61690		
23	292.410	14.28859	0.59218		
24	292.284	14.17002	0.56153		
25	292.159	14.05142	0.52484		
26	292.033	13.93278	0.48200		
27	291.907	13.81411	0.43289		
28	291.781	13.69541	0.37740		
29	291.655	13.57667	0.31542		
30	291.529	13.45790	0.24681		
31	291.403	13.33910	0.17145		
32	291.276	13.22027	0.08923		
33	291.150	13.10140	-0.00000		

DROPLET RADIUS SPECTRUM

J= 16	17	18
2.674	2.674	2.681
2.625	2.630	2.633
2.575	2.581	2.584
2.523	2.530	2.533
2.466	2.474	2.478
2.401	2.411	2.415
2.324	2.336	2.340
2.225	2.242	2.246
2.089	2.113	2.119
1.871	1.914	1.922
1.346	1.482	1.504
0.091	0.092	0.092
0.081	0.081	0.081
0.073	0.073	0.073
0.067	0.067	0.067
0.062	0.063	0.063
0.059	0.059	0.059
0.055	0.055	0.055
0.052	0.052	0.052
0.049	0.050	0.050

OUTPUT AT X=44.00 CM

INDEX	TEMP DEG K	VAPRAT G/KG	SUPERSAT PERCENT	LWCRAT G/KG	DROP CONC NO/CC
1	295.150	16.89101	-0.00000		
2	295.026	16.77295	0.07182		
3	294.903	16.65486	0.13972		
4	294.779	16.53674	0.20362		
5	294.655	16.41859	0.26343		
6	294.532	16.30040	0.31908		
7	294.408	16.18219	0.37047		
8	294.284	16.06394	0.41752		
9	294.160	15.94566	0.46013		
10	294.036	15.82735	0.49821		
11	293.912	15.70901	0.53168		
12	293.787	15.59063	0.56042		
13	293.663	15.47222	0.58435		
14	293.539	15.35378	0.60337		
15	293.414	15.23530	0.61737		
16	293.290	15.11680	0.62626	0.0523771	275.000
17	293.165	14.99834	0.63206	0.0530287	275.000

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

18	293.140	14.87595	0.63470	0.0533219	275.000
19	292.914	14.76131	0.63411		
20	292.789	14.64264	0.62804		
21	292.663	14.52484	0.61638		
22	292.537	14.40843	0.59932		
23	292.412	14.28793	0.57566		
24	292.286	14.16943	0.54678		
25	292.160	14.05069	0.51168		
26	292.034	13.93242	0.47045		
27	291.908	13.81372	0.42296		
28	291.782	13.69508	0.36910		
29	291.656	13.57641	0.30875		
30	291.529	13.45770	0.24179		
31	291.403	13.33897	0.16810		
32	291.276	13.22026	0.08755		
33	291.150	13.10140	-0.00000		

DROPLET RADIUS SPECTRUM

J= 16	17	18
4.024	4.029	4.035
3.956	3.941	3.927
3.947	3.933	3.960
3.907	3.914	3.920
3.864	3.871	3.878
3.814	3.823	3.830
3.755	3.766	3.773
3.661	3.675	3.703
3.586	3.630	3.608
3.421	3.454	3.464
3.052	3.144	3.168
0.086	0.067	0.067
0.078	0.078	0.078
0.071	0.072	0.072
0.066	0.066	0.066
0.062	0.062	0.062
0.058	0.058	0.058
0.054	0.055	0.055
0.052	0.052	0.052
0.049	0.049	0.049

OUTPUT AT Z=55.00 CM

INDEX	TEMP DEG K	VAPRAT G/KG	SUPERSAT PERCENT	LWCRAT G/KG	DROP CONC NO/CC
1	295.150	16.89101	-0.00000		
2	295.027	16.77290	0.07064		
3	294.903	16.65476	0.13736		
4	294.780	16.53658	0.20007		
5	294.656	16.41838	0.25869		
6	294.532	16.30014	0.31313		
7	294.409	16.18187	0.36331		
8	294.285	16.06357	0.40914		
9	294.161	15.94524	0.45053		
10	294.037	15.82688	0.48738		
11	293.913	15.70849	0.51962		
12	293.789	15.59006	0.54713		
13	293.665	15.47160	0.56982		
14	293.540	15.35311	0.58761		
15	293.416	15.23458	0.60037		
16	293.292	15.11602	0.60803	0.1134353	275.000
17	293.167	14.99756	0.61337	0.1144385	275.000
18	293.042	14.87918	0.61634	0.1151249	275.000

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

19	292.916	14.76035	0.61689
20	292.790	14.64257	0.61197
21	292.665	14.52422	0.60148
22	292.539	14.40584	0.58530
23	292.413	14.28742	0.56333
24	292.287	14.16896	0.53546
25	292.161	14.05048	0.50158
26	292.035	13.93196	0.46157
27	291.909	13.81341	0.41533
28	291.782	13.69482	0.36272
29	291.656	13.57620	0.30363
30	291.530	13.45755	0.23794
31	291.403	13.33887	0.16553
32	291.277	13.22015	0.08626
33	291.150	13.10140	-0.00000

DROPLET RADIUS SPECTRUM

J= 16	17	18
5.087	5.092	5.101
5.054	5.060	5.069
5.022	5.028	5.037
4.988	4.995	5.004
4.951	4.959	4.968
4.910	4.918	4.928
4.866	4.871	4.880
4.799	4.811	4.822
4.714	4.732	4.743
4.583	4.611	4.623
4.283	4.361	4.381
0.084	0.085	0.085
0.076	0.077	0.077
0.070	0.070	0.070
0.065	0.065	0.065
0.061	0.061	0.061
0.057	0.057	0.057
0.054	0.054	0.054
0.051	0.051	0.051
0.049	0.049	0.049

OUTPUT AT X=66.00 CM

INDEX	TEMP DEG K	VAPRAT G/KG	SUPERSAT PERCENT	LWCRAT G/KG	DROP CONC NO/CC
1	295.150	16.69101	-0.00000		
2	295.027	16.77236	0.06570		
3	294.903	16.65467	0.13547		
4	294.780	16.53646	0.19722		
5	294.657	16.41821	0.25488		
6	294.533	16.29993	0.30835		
7	294.409	16.18162	0.35756		
8	294.286	16.06328	0.40241		
9	294.162	15.94491	0.44281		
10	294.038	15.82650	0.47866		
11	293.914	15.70807	0.50952		
12	293.790	15.58960	0.53644		
13	293.666	15.47110	0.55814		
14	293.542	15.35257	0.57453		
15	293.418	15.23400	0.58670		
16	293.293	15.11540	0.59335	0.1913719	275.000
17	293.169	14.99692	0.59832	0.1926690	275.000
18	293.343	14.87856	0.60157	0.1939202	275.000
19	292.918	14.76031	0.60304		

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
 20   292.792   14.64203   0.59905
 21   292.666   14.52372   0.58649
 22   292.540   14.40538   0.57427
 23   292.414   14.28700   0.55326
 24   292.286   14.16855   0.52636
 25   292.162   14.05014   0.49347
 26   292.036   13.93167   0.45445
 27   291.909   13.81316   0.40920
 28   291.783   13.69461   0.35760
 29   291.657   13.57604   0.29952
 30   291.530   13.45743   0.23485
 31   291.403   13.33878   0.16346
 32   291.277   13.22011   0.08522
 33   291.150   13.10140   -0.00000

ERCPLET RADIUS SPECTRUM
 J=    16      17      18
  5.585  5.940  6.003
  5.556  5.902  5.974
  5.527  5.933  5.946
  5.856  5.904  5.917
  5.865  5.872  5.865
  5.828  5.836  5.849
  5.765  5.794  5.807
  5.731  5.742  5.756
  5.657  5.672  5.686
  5.542  5.557  5.582
  5.282  5.353  5.371
  0.083  0.083  0.083
  0.075  0.075  0.076
  0.069  0.070  0.070
  0.064  0.065  0.065
  0.060  0.060  0.061
  0.057  0.057  0.057
  0.054  0.054  0.054
  0.051  0.051  0.051
  0.048  0.048  0.048
 * END SIMULATION *
```

Figure 3-31. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
CFD EXP
   1.           .03
 N VS SC
    6
  25.           .002
 100.           .004
 125.           .006
 125.           .008
 100.           .009
  25.           .01
  66.          2.          36.          12.
   3.          6.          15.
 293.15   1000.         295.15     291.15
         30 291.15    1000.          50.
          3 293.15     291.15
    .0625   11.
STOP SIM
```

Figure 3-32. Input Card Images of Continuous Flow Diffusion Experiment Run - Example 2

INPUT PARAMETERS FOR CFD EXPERIMENT

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=30

INDEX	POSITION	VOLUME	AREA
1	0.0	0.344830-01	0.100000 01
2	0.06897	0.689660-01	0.100000 01
3	0.13793	0.689660-01	0.100000 01
4	0.20690	0.689660-01	0.100000 01
5	0.27586	0.689660-01	0.100000 01
6	0.34483	0.689660-01	0.100000 01
7	0.41379	0.689660-01	0.100000 01
8	0.48276	0.689660-01	0.100000 01
9	0.55172	0.689660-01	0.100000 01
10	0.62069	0.689660-01	0.100000 01
11	0.68966	0.689660-01	0.100000 01
12	0.75862	0.689660-01	0.100000 01
13	0.82759	0.689660-01	0.100000 01
14	0.89655	0.689660-01	0.100000 01
15	0.96552	0.689660-01	0.100000 01
16	1.03448	0.689660-01	0.100000 01
17	1.10345	0.689660-01	0.100000 01
18	1.17241	0.689660-01	0.100000 01
19	1.24138	0.689660-01	0.100000 01
20	1.31034	0.689660-01	0.100000 01
21	1.37931	0.689660-01	0.100000 01
22	1.44828	0.689660-01	0.100000 01
23	1.51724	0.689660-01	0.100000 01
24	1.58621	0.689660-01	0.100000 01
25	1.65517	0.689660-01	0.100000 01
26	1.72414	0.689660-01	0.100000 01
27	1.79310	0.689660-01	0.100000 01
28	1.86207	0.689660-01	0.100000 01
29	1.93103	0.689660-01	0.100000 01
30	2.00000	0.344830-01	

CFD CHAMBER LENGTH	66.000 CM
CFD CHAMBER WIDTH	36.000 CM
PLATE SPACING	2.000 CM
INJECTION SLIT LENGTH	12.000 CM
START OF WET-DRY ZONE	3.000 CM
START OF WET-WET ZONE	6.000 CM
TOP PLATE TEMPERATURE	295.150 DEG K
BOTTOM PLATE TEMPERATURE	291.150 DEG K
SATURATOR TEMPERATURE	291.150 DEG K
SATURATOR PRESSURE	1000.000 MB
CARRIER GAS FLOW RATE	50.000 CC/SEC
INITIAL GAS TEMPERATURE	293.150 DEG K
CHAMBER PRESSURE	1000.000 MB
INITIAL SUPERSATURATION	-11.752 PERCENT
HORIZONTAL INCREMENT	0.063 CM
OUTPUT SPACE INCREMENT	11.000 CM
SAMPL INJECTION POINT	15.000 CM

OUTPUT AT X=11.00 CM

INDEX	TEMP	VMXRAT	SUPERSAT

Figure 3-33. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 2.

	DE. K	G/GG	PERCENT
1	295.150	16.89131	-0.00000
2	295.013	16.75251	0.03347
3	294.877	16.61395	0.06143
4	294.740	16.47549	0.08355
5	294.603	16.33737	0.10145
6	294.466	16.19983	0.11420
7	294.329	16.06286	0.12280
8	294.191	15.92767	0.12784
9	294.054	15.78619	0.13001
10	293.917	15.64975	0.13003
11	293.779	15.51435	0.12861
12	293.642	15.37920	0.12643
13	293.504	15.24510	0.12408
14	293.366	15.11263	0.12210
15	293.228	14.98062	0.12065
16	293.090	14.84992	0.12057
17	292.952	14.72032	0.12133
18	292.814	14.59130	0.12304
19	292.676	14.46631	0.12541
20	292.538	14.33777	0.12801
21	292.399	14.21210	0.13024
22	292.261	14.08719	0.13139
23	292.122	13.96291	0.13065
24	291.984	13.83916	0.12714
25	291.845	13.71580	0.11995
26	291.706	13.59272	0.10818
27	291.567	13.46982	0.09100
28	291.428	13.34701	0.06763
29	291.289	13.22421	0.03745
30	291.150	13.10140	-0.00000

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=33

INDEX	POSITION	VOLUME	AREA
1	0.0	0.312500D-01	0.100000D 01
2	0.06250	0.625000D-01	0.100000D 01
3	0.12500	0.625000D-01	0.100000D 01
4	0.18750	0.625000D-01	0.100000D 01
5	0.25000	0.625000D-01	0.100000D 01
6	0.31250	0.625000D-01	0.100000D 01
7	0.37500	0.625000D-01	0.100000D 01
8	0.43750	0.625000D-01	0.100000D 01
9	0.50000	0.625000D-01	0.100000D 01
10	0.56250	0.625000D-01	0.100000D 01
11	0.62500	0.625000D-01	0.100000D 01
12	0.68750	0.625000D-01	0.100000D 01
13	0.75000	0.625000D-01	0.100000D 01
14	0.81250	0.625000D-01	0.100000D 01
15	0.87500	0.625000D-01	0.100000D 01
16	0.93750	0.625000D-01	0.100000D 01
17	1.00000	0.625000D-01	0.100000D 01
18	1.06250	0.625000D-01	0.100000D 01
19	1.12500	0.625000D-01	0.100000D 01
20	1.18750	0.625000D-01	0.100000D 01
21	1.25000	0.625000D-01	0.100000D 01
22	1.31250	0.625000D-01	0.100000D 01
23	1.37500	0.625000D-01	0.100000D 01

Figure 3-33. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

24	1.43750	0.625000-01	0.100000 01
25	1.50000	0.625000-01	0.100000 01
26	1.56250	0.625000-01	0.100000 01
27	1.62500	0.625000-01	0.100000 01
28	1.68750	0.625000-01	0.100000 01
29	1.75000	0.625000-01	0.100000 01
30	1.81250	0.625000-01	0.100000 01
31	1.87500	0.625000-01	0.100000 01
32	1.93750	0.625000-01	0.100000 01
33	2.00000	0.312500-01	

AEROSOL/DROPLET PARAMETERS

ACCOMMODATION COEFF 1.000
CONDENSATION COEFF 0.030

NUMBER OF DROPLET CLASSES= 6

CLASS	NO/CC	CRIT SSAT	CRIT RADIUS	INIT RADIUS	A	B
1	25.00	0.00200	0.35929D-04	0.70222D-05	0.10749D-06	0.45994D-16
2	100.00	0.00400	0.17914D-04	0.43224D-05	0.10749D-06	0.11498D-16
3	125.00	0.00600	0.11943D-04	0.32366D-05	0.10749D-06	0.51104D-17
4	125.00	0.00800	0.89572D-05	0.26278D-05	0.10749D-06	0.28746D-17
5	100.00	0.00990	0.79620D-05	0.24108D-05	0.10749D-06	0.22713D-17
6	25.00	0.01000	0.71658D-05	0.22309D-05	0.10749D-06	0.18398D-17

TOTAL SAMPLE GAS FLOW 2.730 CC/SEC
TOTAL PARTICLE FLUX 1365.124 NC/SEC

OUTPUT AT X=22.00 CM

INDEX	TEMP DEG K	VMRRAT G/KG	SUPERSAT PERCENT	LPXRAT G/KG	DROP CONC NC/CC
1	295.150	16.89101	-0.00000		
2	295.026	16.77232	0.07018		
3	294.902	16.65359	0.13640		
4	294.778	16.53484	0.19859		
5	294.654	16.41606	0.25670		
6	294.530	16.29727	0.31068		
7	294.406	16.17847	0.36049		
8	294.281	16.05967	0.40605		
9	294.157	15.94087	0.44745		
10	294.033	15.82205	0.48455		
11	293.908	15.70333	0.51735		
12	293.784	15.58461	0.54583		
13	293.659	15.46593	0.56995		
14	293.534	15.34730	0.58967		
15	293.409	15.22872	0.60495		
16	293.284	15.11020	0.61571	0.0000714	125.000
17	293.159	14.99174	0.62194	0.0000728	125.000
18	293.034	14.87335	0.62353	0.0000730	125.000
19	292.909	14.75502	0.62041		
20	292.784	14.63675	0.61244		
21	292.659	14.51853	0.59949		
22	292.534	14.40036	0.58144		
23	292.408	14.28223	0.55814		
24	292.283	14.16414	0.52943		
25	292.157	14.04607	0.49515		
26	292.032	13.92802	0.45515		
27	291.906	13.80997	0.40923		
28	291.780	13.69192	0.35723		
29	291.654	13.57386	0.29897		

Figure 3-33. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

30	291.028	13.45575	0.23426
31	291.402	13.33709	0.16299
32	291.276	13.21956	0.08455
33	291.150	13.10140	-0.00000

DROPLET RADIUS SPECTRUM

J= 16	17	18
0.791	0.793	0.793
0.415	0.421	0.422
0.110	0.112	0.112
0.065	0.066	0.066
0.056	0.056	0.056
0.049	0.049	0.049

OUTPUT AT X=33.00 CM

INDEX	TEMP DEG K	VMXRAT G/KG	SUPERSAT PERCENT	LPXRAT G/KG	DROP CONC NO/CC
1	295.150	16.89101	-0.00000		
2	295.026	16.77303	0.07354		
3	294.902	16.65531	0.14718		
4	294.779	16.53897	0.20882		
5	294.655	16.41865	0.27039		
6	294.531	16.30178	0.32781		
7	294.407	16.18264	0.38058		
8	294.282	16.06447	0.42582		
9	294.158	15.94627	0.47423		
10	294.034	15.82803	0.51412		
11	293.909	15.70976	0.54929		
12	293.785	15.59146	0.57996		
13	293.660	15.47312	0.60572		
14	293.536	15.35476	0.62657		
15	293.411	15.23636	0.64242		
16	293.287	15.11792	0.65315	0.0102830	250.000
17	293.162	14.99950	0.65962	0.0105467	250.000
18	293.037	14.88108	0.66176	0.0106095	250.000
19	292.911	14.76267	0.65948		
20	292.786	14.64422	0.65169		
21	292.661	14.52574	0.63830		
22	292.535	14.40723	0.61919		
23	292.409	14.28868	0.59426		
24	292.284	14.17010	0.56340		
25	292.158	14.05149	0.52650		
26	292.032	13.93284	0.48346		
27	291.907	13.81416	0.43414		
28	291.781	13.69545	0.37845		
29	291.655	13.57671	0.31626		
30	291.529	13.45793	0.24744		
31	291.402	13.33912	0.17187		
32	291.276	13.22027	0.08944		
33	291.150	13.10140	-0.00000		

DROPLET RADIUS SPECTRUM

J= 16	17	18
2.731	2.735	2.737
2.471	2.479	2.482
1.875	1.921	1.930
0.067	0.068	0.068
0.057	0.057	0.057
0.050	0.050	0.050

OUTPUT AT X=44.00 CM

Figure 3-33. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

INDEX	TEMP DEG K	VMXRAT G/KG	SUPERSAT PERCENT	LPXRAT G/KG	DROP CONC NO/CC
1	295.150	16.89101	-0.00000		
2	295.026	16.77296	0.07211		
3	294.903	16.65439	0.14031		
4	294.779	16.53678	0.20451		
5	294.655	16.41864	0.26462		
6	294.531	16.30047	0.32057		
7	294.408	16.18227	0.37227		
8	294.284	16.06403	0.41962		
9	294.160	15.94577	0.46255		
10	294.035	15.82747	0.50094		
11	293.911	15.70914	0.53472		
12	293.787	15.59078	0.56379		
13	293.663	15.47238	0.58804		
14	293.538	15.35395	0.60739		
15	293.414	15.23549	0.62172		
16	293.289	15.11700	0.63095	0.0454476	250.000
17	293.164	14.99845	0.63687	0.0460979	250.000
18	293.039	14.88015	0.63542	0.0463564	250.000
19	292.914	14.76180	0.63852		
20	292.788	14.64342	0.63214		
21	292.663	14.52500	0.62017		
22	292.537	14.40655	0.60250		
23	292.411	14.28806	0.57902		
24	292.285	14.16955	0.54964		
25	292.160	14.05100	0.51422		
26	292.034	13.93241	0.47267		
27	291.908	13.81379	0.42487		
28	291.782	13.69514	0.37070		
29	291.655	13.57646	0.31004		
30	291.529	13.45774	0.24276		
31	291.403	13.33899	0.16875		
32	291.276	13.22021	0.08787		
33	291.150	13.10140	-0.00000		

DROPLET RADIUS SPECTRUM

J= 16	17	18
4.076	4.080	4.086
3.875	3.883	3.890
3.436	3.468	3.476
0.066	0.056	0.066
0.056	0.050	0.056
0.049	0.049	0.049

OUTPUT AT X=55.00 CM

INDEX	TEMP DEG K	VMXRAT G/KG	SUPERSAT PERCENT	LPXRAT G/KG	DROP CONC NO/CC
1	295.150	16.89101	-0.00000		
2	295.027	16.77292	0.07101		
3	294.903	16.65479	0.13810		
4	294.780	16.53663	0.20118		
5	294.656	16.41844	0.26017		
6	294.532	16.30022	0.31499		
7	294.408	16.18197	0.36555		
8	294.285	16.06369	0.41176		
9	294.161	15.94538	0.45353		
10	294.037	15.82703	0.49078		
11	293.913	15.70865	0.52340		
12	293.788	15.59024	0.55131		
13	293.664	15.47180	0.57440		

Figure 3-33. Example Output of the Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

14	293.540	15.35332	0.55259		
15	293.416	15.23451	0.60576		
16	293.291	15.11627	0.61383	0.1006745	250.000
17	293.166	14.99781	0.61932	0.1016675	250.000
18	293.041	14.87943	0.62219	0.1022669	250.000
19	292.916	14.76112	0.62236		
20	292.792	14.64279	0.61765		
21	292.668	14.52442	0.60618		
22	292.538	14.40602	0.58562		
23	292.413	14.28758	0.56726		
24	292.287	14.16911	0.53901		
25	292.161	14.05061	0.50474		
26	292.035	13.93207	0.46435		
27	291.908	13.81350	0.41771		
28	291.782	13.69490	0.36471		
29	291.656	13.57627	0.30523		
30	291.530	13.45760	0.23914		
31	291.403	13.33890	0.16623		
32	291.277	13.22016	0.08666		
33	291.150	13.10140	-0.00000		

DROPLET RADIUS SPECTRUM

J=	16	17	18
	5.140	5.145	5.154
	4.970	4.978	4.987
	4.604	4.632	4.644
	0.065	0.066	0.066
	0.056	0.056	0.056
	0.049	0.049	0.049

OUTPUT AT X=66.00 CM

INDEX	TEMP DEG K	VMXRAT G/KG	SUPERSAT PERCENT	LMXRAT G/KG	DRCP	CONC NC/CC
1	295.150	16.89101	-0.00000			
2	295.027	16.77288	0.07012			
3	294.903	16.65471	0.13621			
4	294.780	16.53651	0.19849			
5	294.656	16.41829	0.25658			
6	294.533	16.30003	0.31049			
7	294.409	16.18174	0.36013			
8	294.285	16.06341	0.40542			
9	294.161	15.94506	0.44627			
10	294.038	15.82667	0.48258			
11	293.914	15.70826	0.51428			
12	293.790	15.58981	0.54125			
13	293.665	15.47133	0.56340			
14	293.541	15.35281	0.58065			
15	293.417	15.23427	0.59288			
16	293.293	15.11565	0.60001	0.1717781		250.000
17	293.168	14.99721	0.60515	0.1730678		250.000
18	293.043	14.87884	0.60827	0.1741579		250.000
19	292.917	14.76058	0.60931			
20	292.791	14.64228	0.60488			
21	292.666	14.52395	0.59489			
22	292.540	14.40558	0.57923			
23	292.414	14.28719	0.55778			
24	292.288	14.16876	0.53044			
25	292.162	14.05025	0.49710			
26	292.035	13.93180	0.45764			
27	291.909	13.81327	0.41194			
28	291.783	13.69471	0.35989			

Figure 3-33. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

29	291.454	13.57611	0.30136
30	291.330	13.45748	0.23623
31	291.403	13.33982	0.16438
32	291.277	13.22012	0.08568
33	291.150	13.10146	-0.00000

DROPLET RADIUS SPECTRUM

J= 16	17	18
6.041	6.046	6.050
5.891	5.896	5.911
5.570	5.595	5.610
0.065	0.065	0.065
0.055	0.055	0.055
0.048	0.049	0.049

Figure 3-33. Sample Output of the Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

3.2.5 CFD Fluid Flow Module

3.2.5.1 Vertical Plane Fluid Model

The vertical plane fluid model calculates the streamlines and velocities for a steady-state flow in a two-dimensional isothermal CFD chamber in a zero gravity environment. The dimensions of the chamber as well as the flowrates of the carrier or sheath flow (CFLORT) and the aerosol-laden flow (AFLORT) can be varied. Although the calculation is essentially two dimensional, the width (WIDTH) of the chamber must be supplied in order to calculate in mean fluid velocity from the flowrate. The width of the exit port (XWIDTH) is also supplied for completeness, but is not used in the calculation. It is assumed equal to the chamber width.

The elliptical injection manifold is placed a distance (DOWNST) downstream of the chamber inlet. A rectangular grid is placed over the chamber with NY points in the vertical dimensions (large Y grid) and MZ points in the longitudinal dimension (Z grid). Downstream of the center of the elliptical injection manifold, NS small S grid points are inserted between the first and second Y grid point. The first and last S grid points coincide with the first and second Y grid points respectively.

The CFD vertical plane fluid model input parameters are described as follows. All input quantities are assumed to be in CGS (centimeter-gram-second) units.

1. The kinematic viscosity of the fluid (VISCK).
2. The carrier or sheath flow flowrate (CFLORT).
3. The aerosol flowrate (AFLORT)
4. The chamber height or spacing between plates (HEIGHT).
5. The width of the chamber (WIDTH).
6. Total length from the chamber inlet to the downstream end of the exit port (DIST).
7. The height of the throat or region in the elliptical injection manifold where the aerosol-laden flow is formed (HOPEN).

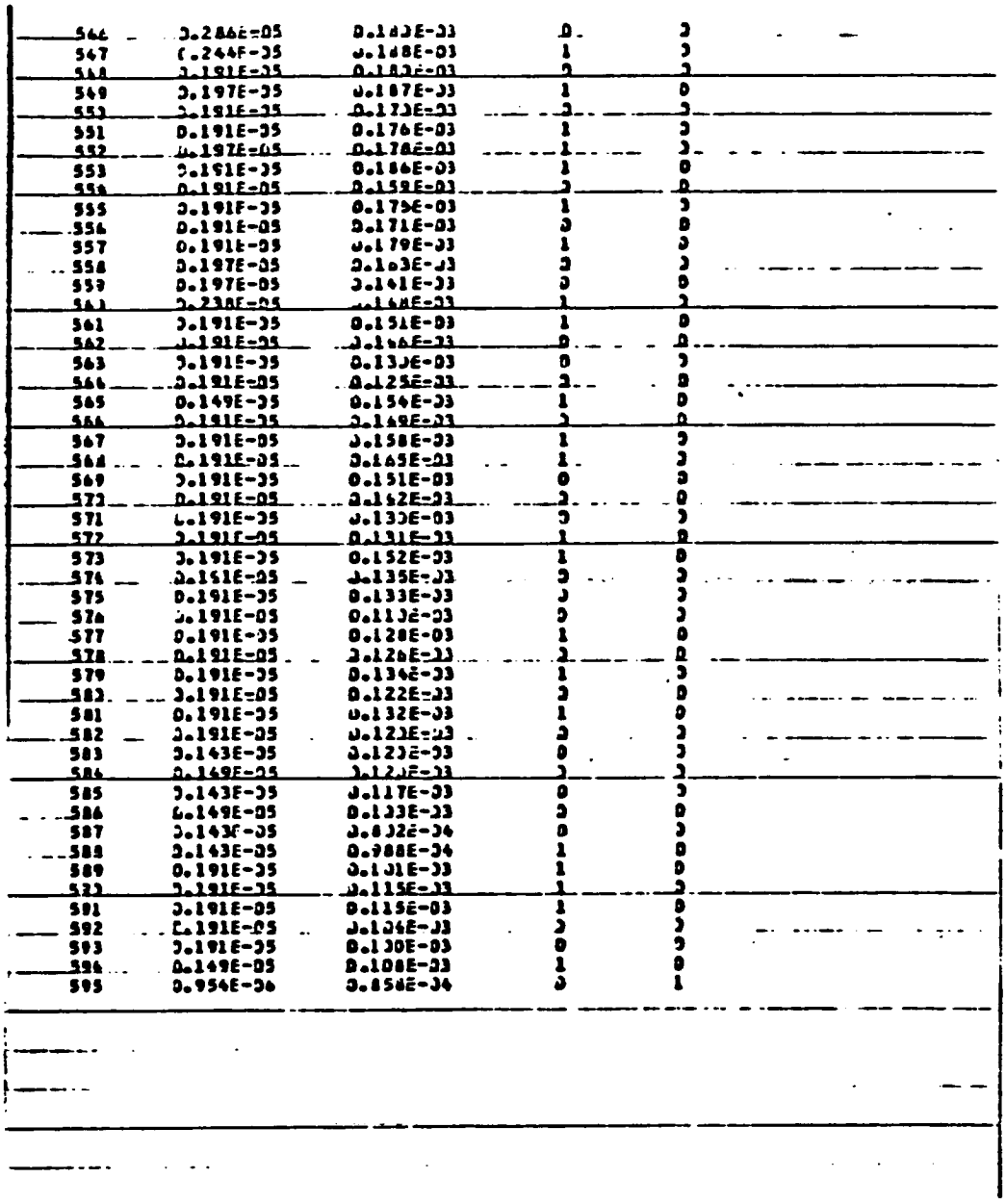
8. The width of the throat (TWIDTH).
9. The length of the throat (THROAT).
10. Axis of elliptical injection manifold in the vertical dimension (A).
11. Axis of elliptical injection manifold in the horizontal dimension (B).
12. The distance from the chamber inlet to the center of the elliptical injection manifold (DOWNST).
13. The length of the exit port (XLEN). The program checks this length to be sure the length is long enough for a Poiseuille flow to develope. If it is not developed, the proper length is calculated and the program aborted.
14. The height of the exit port (XHGT).
15. The width of the exit port (XWIDTH).
16. Minimum number of iterations to be done (ITMIN).
17. Maximum number of iterations (ITMAX).
18. Convergence parameter (CONCRT) usually assumed to be 1.0×10^{-6}.
19. The relaxation coefficient (RELAX) usually in the range of 1.0 to 1.4.
20. The number of grid points in the large Y grid (NY).
21. The number of grid points in the small S grid (NS).
22. The number of grid points in the longitudinal Z grid (MZ).
23. The minimum number of S grid points in the throat height (NTMIN). The throat height is enlarged to NTMIN times S grid spacing if the throat height is less than that.

3.2.5.2 CFD Fluid Flow (Vertical) Calculation Example

This example is given to illustrate the calculation of flow fluid in the vertical plane. The listings of input stream are given in Figure 3-36. The corresponding output listings are shown in Figures 3-37 through 3-42.

```
  0.14          VISCK    F10.3  FLUID VISCOSITY
 72.0           CFLORT   F10.3  CARRIER FLOW RATE ---------- (CM**3)/SEC
  2.00          AFLORT   F10.3  AEROSOL FLOW RATE            (CM**3)/SEC
  2.0           HEIGHT   F10.3  FULL CHAMBER HEIGHT                    CM
 36.0           WIDTH    F10.3  FULL CHAMBER WIDTH                     CM
 15.0           DIST     F10.3  TOTAL CHAMBER LENGTH(W/ EXIT PORT)     CM
7.400E-03       HOPEN    E10.3  FULL THROAT HEIGHT                     CM
 12.0           TWIDTH   F10.3  FULL THROAT WIDTH                      CM
  0.60          THROAT   F10.3  THROAT LENGTH                         CM
  0.501         A        F10.3  ELLIPSE AXIS(PERPENDICULAR TO FLOW)   CM
  1.501         B        F10.3  ELLIPSE AXIS(PARALLEL TO FLOW)        CM
  5.0           DOWNST   F10.3  LOCATION OF CENTER OF ELLIPSE         CM
  2.0           XLEN     F10.3  LENGTH OF EXIT PORT                   CM
  0.4           XHGT     F10.3  FULL HEIGHT OF EXIT PORT              CM
 36.0           XWIDTH   F10.3  FULL WIDTH OF EXIT PORT               CM
    1           ITMIN    I5     MINIMUM NUMBER OF ITERATIONS
 3000           ITMAX    I5     MAXIMUM NUMBER OF ITERATIONS
1.000E-06       CONCRT   E10.3  CONVERGENCE CRITERION
 1.00           RELAX    F10.3  RELAXATION COEFFICIENT
   21           NY       I5     NUMBER OF POINTS IN LARGE Y GRID
   31           NS       I5     NUMBER OF POINTS IN SMALL Y (S) GRID
  101           MZ       I5     NUMBER OF POINTS IN Z GRID
    4           NTMIN    I5     MINIMUM NUMBER OF GRID POINTS IN THROAT
```

Figure 3-36. Input Card Image of Fluid Flow (Vertical) Calculation



544	0.286E-05	0.183E-03	0	0
547	0.244E-05	0.148E-03	1	0
548	0.191E-05	0.183E-03	0	0
549	0.197E-05	0.187E-03	1	0
550	0.191E-05	0.173E-03	0	0
551	0.191E-05	0.176E-03	1	0
552	0.197E-05	0.178E-03	1	0
553	0.191E-05	0.186E-03	1	0
554	0.191E-05	0.159E-03	0	0
555	0.191E-05	0.179E-03	1	0
556	0.191E-05	0.171E-03	0	0
557	0.191E-05	0.179E-03	1	0
558	0.197E-05	0.163E-03	0	0
559	0.197E-05	0.141E-03	0	0
561	0.238E-05	0.146E-03	1	0
561	0.191E-05	0.151E-03	1	0
562	0.191E-05	0.146E-03	0	0
563	0.191E-05	0.130E-03	0	0
564	0.191E-05	0.125E-03	0	0
565	0.149E-05	0.154E-03	1	0
566	0.191E-05	0.149E-03	0	0
567	0.191E-05	0.158E-03	1	0
568	0.191E-05	0.165E-03	1	0
569	0.191E-05	0.151E-03	0	0
572	0.191E-05	0.162E-03	0	0
571	0.191E-05	0.130E-03	0	0
572	0.191E-05	0.131E-03	1	0
573	0.191E-05	0.152E-03	1	0
574	0.191E-05	0.135E-03	0	0
575	0.191E-05	0.133E-03	0	0
576	0.191E-05	0.113E-03	0	0
577	0.191E-05	0.128E-03	1	0
578	0.191E-05	0.126E-03	0	0
579	0.191E-05	0.134E-03	1	0
583	0.191E-05	0.122E-03	0	0
581	0.191E-05	0.132E-03	1	0
582	0.191E-05	0.121E-03	0	0
583	0.143E-05	0.123E-03	0	0
584	0.149E-05	0.122E-03	0	0
585	0.143E-05	0.117E-03	0	0
586	0.149E-05	0.133E-03	0	0
587	0.143E-05	0.832E-04	0	0
588	0.143E-05	0.988E-04	1	0
589	0.191E-05	0.131E-03	1	0
591	0.191E-05	0.115E-03	1	0
592	0.191E-05	0.136E-03	0	0
593	0.191E-05	0.130E-03	0	0
596	0.149E-05	0.108E-03	1	0
595	0.954E-06	0.858E-04	0	1

Figure 3-37. The progress of the calculation towards convergence is printed after every iteration. The quantities printed are iteration number (IT), largest difference at any point (BIGDIF), sum of differences at all points (TOTDIF), divergence code (IDIV), and convergence code (ICODE).

CFD FLUID DYNAMICS

FLUID PARAMETERS

CARRIER FLOW RATE: 22.000 (CM**3)/SEC AEROSOL FLOW RATE: 2.000 (CM**3)/SEC

VISCOSITY: 0.140 (GM**2)/SEC

CHAMBER DIMENSIONS

LENGTH: 15.000 CM HEIGHT: 2.000 CM WIDTH: 36.000 CM

ELLIPSE DIMENSIONS

DISTANCE FROM INLET TO CENTER OF ELLIPSE: 5.000 CM LENGTH: 3.000 CM HEIGHT: 1.000 CM

THROAT DIMENSIONS

LENGTH: 3.000 CM HEIGHT: 2.100E-01 CM WIDTH: 12.000 CM

EXIT PORT DIMENSIONS

LENGTH: 2.000 CM HEIGHT: 2.400 CM WIDTH: 36.000 CM

NUMBER OF GRID POINTS

SMALL Y GRID: 31 LARGE Y GRID: 21 Z GRID: 131

CONVERGENCE PARAMETERS

CONVERGENCE CRITERION: 2.100E-05 RELAXATION COEFFICIENT: 1.000

Figure 3-38. Description of chamber and fluids. The parameters printed here are not exactly the same as those which were input. Some distances are rounded off for ease in locating chamber walls, the manifold, etc.

. Z GRID NUMBER: 6 DOWNSTREAM DISTANCE = 0.750 CM

LARGE Y GRID POINTS

N	STREAM FUNCTION	X-VELOCITY	Y-VELOCITY	VORTICITY
1	0.100E 01	0.127E 01	0.0	0.0
2	0.937E 00	0.127E 01	-0.213E-01	-0.191E-01
3	0.873E 00	0.127E 01	-0.423E-01	-0.394E-01
4	0.813E 00	0.127E 01	-0.624E-01	-0.711E-01
5	0.746E 00	0.127E 01	-0.812E-01	-0.118E 00
6	0.683E 00	0.127E 01	-0.983E-01	-0.185E 00
7	0.619E 00	0.126E 01	-0.113E 00	-0.279E 00
8	0.556E 00	0.125E 01	-0.125E 00	-0.402E 00
9	0.494E 00	0.124E 01	-0.134E 00	-0.558E 00
10	0.432E 00	0.122E 01	-0.138E 00	-0.751E 00
11	0.372E 00	0.119E 01	-0.138E 00	-0.982E 00
12	0.314E 00	0.115E 01	-0.134E 00	-0.125E 01
13	0.258E 00	0.109E 01	-0.125E 00	-0.155E 01
14	0.205E 00	0.102E 01	-0.111E 00	-0.188E 01
15	0.156E 00	0.928E 00	-0.934E-01	-0.222E 01
16	0.112E 00	0.819E 00	-0.734E-01	-0.257E 01
17	0.739E-01	0.691E 00	-0.524E-01	-0.292E 01
18	0.428E-01	0.549E 00	-0.324E-01	-0.329E 01
19	0.196E-01	0.378E 00	-0.156E-01	-0.354E 01
20	0.504E-02	0.190E 00	-0.422E-02	-0.380E 01
21	0.0	0.0	0.0	-0.403E 01

Figure 3-39. Stream function, velocity components and vorticity upstream of the elliptical injection manifold. In this region only the large Y grid is used.

Z GRID NUMBER: 43 DOWNSTREAM DISTANCE = 5.859 CM

SMALL Y GRID POINTS

N	STREAM FUNCTION	Z-VELOCITY	Y-VELOCITY	VORTICITY
1	0.108E 01	0.237E 02	0.0	0.0
2	0.104E 01	0.211E 02	-0.254E-04	-0.316E 04
3	0.101E 01	0.182E 02	-0.223E-04	-0.632E 04
4	0.100E 01	0.0	0.0	-0.947E 04

LARGE Y GRID POINTS

N	STREAM FUNCTION	Z-VELOCITY	Y-VELOCITY	VORTICITY
8	0.103E 01	0.0	0.0	0.126E 02
9	0.986E 00	0.553E 00	-0.168E 00	0.116E 02
10	0.945E 00	0.136E 01	-0.306E 00	0.104E 02
11	0.879E 00	0.191E 01	-0.395E 00	0.880E 01
12	0.793E 00	0.189E 01	-0.437E 00	0.683E 01
13	0.691E 00	0.216E 01	-0.439E 00	0.454E 01
14	0.577E 00	0.232E 01	-0.409E 00	0.202E 01
15	0.459E 00	0.235E 01	-0.354E 00	-0.599E 00
16	0.342E 00	0.225E 01	-0.283E 00	-0.323E 01
17	0.234E 00	0.203E 01	-0.205E 00	-0.576E 01
18	0.145E 00	0.168E 01	-0.129E 00	-0.813E 01
19	0.558E-01	0.122E 01	-0.641E-01	-0.103E 02
20	0.176E-01	0.658E 00	-0.182E-01	-0.123E 02
21	0.0	0.0	0.0	-0.141E 02

Figure 3-40. Output in the nested grid region. The small Y grid (S grid) describes flow in the throat while the large Y grid describes flow over the elliptical injection manifold.

Z GRID NUMBER= 56 DOWNSTREAM DISTANCE = 0.250 CM

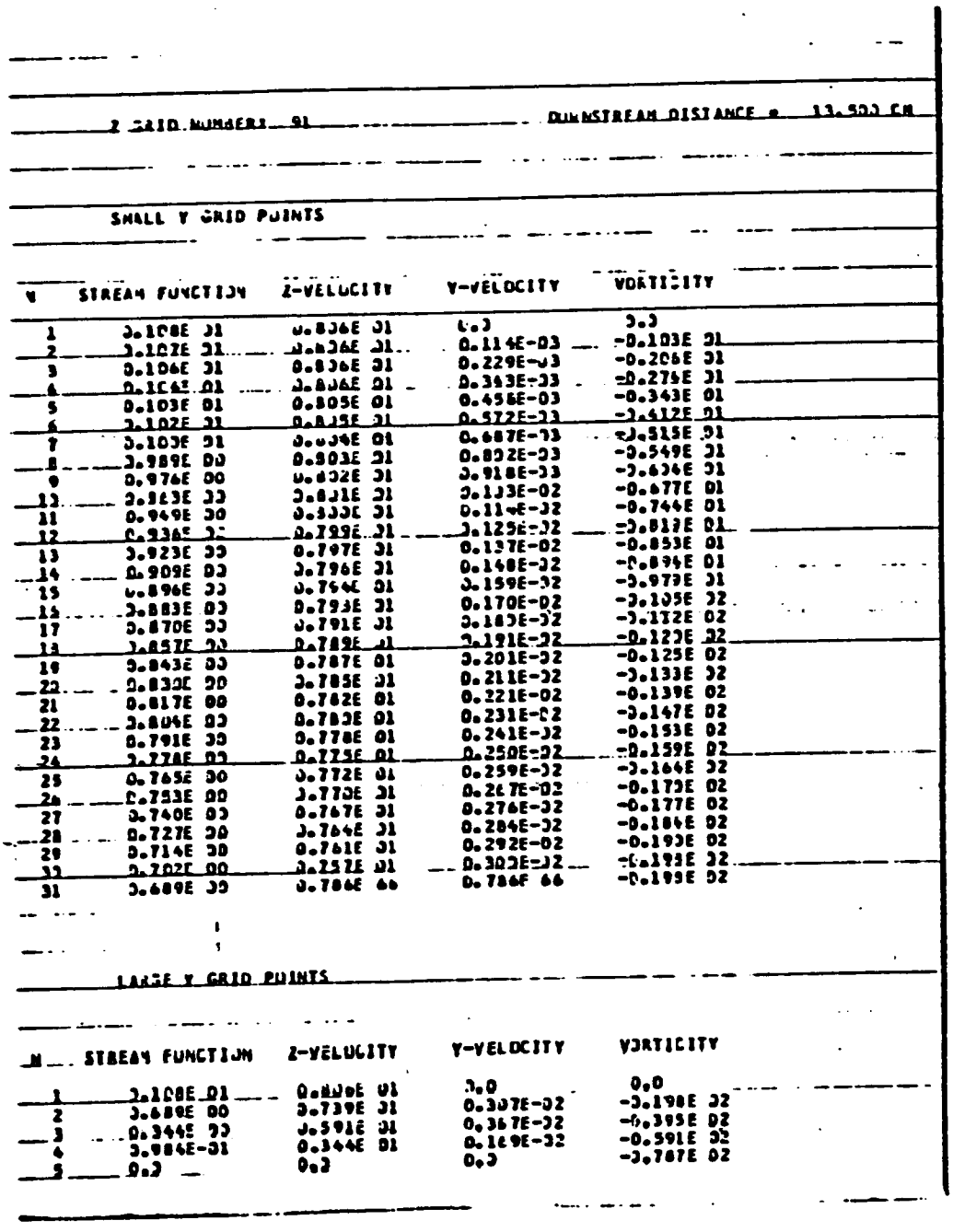
SMALL Y GRID POINTS

N	STREAM FUNCTION	Z-VELOCITY	Y-VELOCITY	VORTICITY
1	0.108E 01	0.163E 01	0.0	0.0
2	0.108E 01	0.163E 01	-0.636E-04	-0.103E 01
3	0.108E 01	0.162E 01	-0.127E-03	-0.103E 01
4	0.108E 01	0.162E 01	-0.188E-03	-0.687E 00
5	0.107E 01	0.162E 01	-0.251E-03	-0.103E 01
6	0.107E 01	0.162E 01	-0.312E-03	-0.103E 01
7	0.107E 01	0.162E 01	-0.372E-03	-0.103E 01
8	0.106E 01	0.162E 01	-0.436E-03	-0.688E 00
9	0.106E 01	0.162E 01	-0.502E-03	-0.688E 00
10	0.106E 01	0.161E 01	-0.569E-03	-0.345E 00
11	0.106E 01	0.161E 01	-0.642E-03	-0.688E 00
12	0.105E 01	0.161E 01	-0.718E-03	-0.688E 00
13	0.105E 01	0.161E 01	-0.795E-03	-0.689E 00
14	0.105E 01	0.161E 01	-0.871E-03	-0.689E 00
15	0.105E 01	0.161E 01	-0.944E-03	-0.689E 00
16	0.104E 01	0.161E 01	-0.102E-02	-0.689E 00
17	0.104E 01	0.161E 01	-0.109E-02	-0.103E 01
18	0.104E 01	0.161E 01	-0.116E-02	-0.690E 00
19	0.103E 01	0.160E 01	-0.124E-02	-0.690E 00
20	0.103E 01	0.159E 01	-0.131E-02	-0.690E 00
21	0.103E 01	0.160E 01	-0.139E-02	-0.689E 00
22	0.103E 01	0.160E 01	-0.146E-02	-0.690E 00
23	0.102E 01	0.160E 01	-0.154E-02	-0.690E 00
24	0.102E 01	0.160E 01	-0.161E-02	-0.103E 01
25	0.102E 01	0.160E 01	-0.168E-02	-0.103E 01
26	0.102E 01	0.159E 01	-0.176E-02	-0.103E 01
27	0.101E 01	0.159E 01	-0.183E-02	-0.103E 01
28	0.101E 01	0.159E 01	-0.191E-02	-0.103E 01
29	0.101E 01	0.159E 01	-0.199E-02	-0.692E 00
30	0.101E 01	0.159E 01	-0.206E-02	-0.104E 01
31	0.100E 01	0.160E 01	-0.214E-02	-0.153E 00

LARGE Y GRID POINTS

N	STREAM FUNCTION	Z-VELOCITY	Y-VELOCITY	VORTICITY
1	0.108E 01	0.163E 01	0.0	0.0
2	0.103E 01	0.160E 01	-0.214E-02	-0.153E 00
3	0.923E 00	0.159E 01	-0.617E-02	-0.395E 00
4	0.844E 00	0.157E 01	-0.999E-02	-0.459E 00
5	0.766E 00	0.155E 01	-0.753E-02	-0.619E 00
6	0.689E 00	0.151E 01	-0.870E-02	-0.775E 00
7	0.614E 00	0.147E 01	-0.949E-02	-0.937E 00
8	0.542E 00	0.142E 01	-0.986E-02	-0.113E 01
9	0.472E 00	0.136E 01	-0.983E-02	-0.127E 01
10	0.405E 00	0.130E 01	-0.943E-02	-0.146E 01
11	0.342E 00	0.122E 01	-0.872E-02	-0.161E 01
12	0.283E 00	0.116E 01	-0.777E-02	-0.178E 01
13	0.228E 00	0.105E 01	-0.664E-02	-0.195E 01
14	0.178E 00	0.946E 00	-0.543E-02	-0.212E 01
15	0.133E 00	0.836E 00	-0.420E-02	-0.229E 01
16	0.946E-01	0.718E 00	-0.334E-02	-0.246E 01
17	0.616E-01	0.591E 00	-0.201E-02	-0.263E 01
18	0.353E-01	0.436E 00	-0.115E-02	-0.279E 01
19	0.165E-01	0.312E 00	-0.520E-03	-0.296E 01
20	0.410E-02	0.143E 01	-0.131E-03	-0.312E 01
21	0.0	0.0	0.0	-0.328E 01

Figure 3-41. Output downstream of elliptical injection manifold. The first and last points of the small Y grid (S grid) coincide with the first and second points of the large Y grid.



X GRID NUMBER= 91 DOWNSTREAM DISTANCE = 13.500 CM

SMALL Y GRID POINTS

N	STREAM FUNCTION	Z-VELOCITY	Y-VELOCITY	VORTICITY
1	0.108E 01	0.836E 01	0.0	0.0
2	0.107E 01	0.836E 01	0.114E-03	-0.103E 01
3	0.106E 01	0.836E 01	0.229E-03	-0.206E 01
4	0.104E 01	0.836E 01	0.343E-03	-0.276E 01
5	0.103E 01	0.835E 01	0.458E-03	-0.343E 01
6	0.102E 01	0.835E 01	0.572E-03	-0.412E 01
7	0.101E 01	0.834E 01	0.687E-03	-0.515E 01
8	0.989E 00	0.833E 01	0.802E-03	-0.549E 01
9	0.976E 00	0.832E 01	0.918E-03	-0.634E 01
10	0.963E 00	0.831E 01	0.103E-02	-0.677E 01
11	0.949E 00	0.830E 01	0.114E-02	-0.744E 01
12	0.936E 00	0.799E 01	0.129E-02	-0.812E 01
13	0.923E 00	0.797E 01	0.137E-02	-0.853E 01
14	0.909E 00	0.796E 01	0.148E-02	-0.894E 01
15	0.896E 00	0.794E 01	0.159E-02	-0.979E 01
16	0.883E 00	0.793E 01	0.170E-02	-0.105E 02
17	0.870E 00	0.791E 01	0.180E-02	-0.112E 02
18	0.857E 00	0.789E 01	0.191E-02	-0.122E 02
19	0.843E 00	0.787E 01	0.201E-02	-0.125E 02
20	0.830E 00	0.785E 01	0.211E-02	-0.133E 02
21	0.817E 00	0.782E 01	0.221E-02	-0.139E 02
22	0.804E 00	0.780E 01	0.231E-02	-0.147E 02
23	0.791E 00	0.778E 01	0.241E-02	-0.153E 02
24	0.778E 00	0.775E 01	0.250E-02	-0.159E 02
25	0.765E 00	0.772E 01	0.259E-02	-0.164E 02
26	0.753E 00	0.770E 01	0.267E-02	-0.172E 02
27	0.740E 00	0.767E 01	0.276E-02	-0.177E 02
28	0.727E 00	0.764E 01	0.284E-02	-0.184E 02
29	0.714E 00	0.761E 01	0.292E-02	-0.193E 02
30	0.702E 00	0.757E 01	0.300E-02	-0.193E 02
31	0.689E 00	0.786E 00	0.786E 00	-0.193E 02

LARGE Y GRID POINTS

N	STREAM FUNCTION	Z-VELOCITY	Y-VELOCITY	VORTICITY
1	0.108E 01	0.836E 01	0.0	0.0
2	0.689E 00	0.739E 01	0.307E-02	-0.198E 02
3	0.344E 00	0.591E 01	0.367E-02	-0.395E 02
4	0.984E-01	0.344E 01	0.169E-02	-0.591E 02
5	0.0	0.0	0.0	-0.787E 02

Figure 3-42. Flow quantities in the exit port. The small Y grid (S grid) is nested between the first and second points of the large Y grid.

3.2.5.3 Horizontal Plane Fluid Flow Model

The Horizontal plane fluid dynamics model calculates the streamlines and velocities for a steady-state flow in a rectangular chamber which empties into a narrow exit port. The exit is assumed to be symmetrically located along the chamber centerline. Once the streamline and velocities have been calculated, residence times may be calculated for various paths. The path is specified by its distance from the centerline at the inlet (Z=0) and the initial and final points of interest. It is possible to use either a no-slip or a uniform flow boundary condition at the X boundary in the chamber. A no-slip boundary condition simulates a solid wall at the boundary while a uniform flow condition approximates a several exit port configuration.

As currently designed, the program does not read an input file. The parameters are listed in subroutine INPUT and can be changed at any time. The program must then be recompiled before running. The parameters are listed below.

1. The kinematic viscosity of the fluid (VISCK)
2. Initial fluid velocity (WINIT).
3. Width of the CFD chamber (CWID).
4. Length of the CFD chamber (CLEN).
5. Width of the exit port (XWID).
6. Length of exit port (XLEN). The length of the exit port is tested to insure that it is long enough for a Poiseuille flow to be developed. If not, the proper length is calculated and the program aborted.
7. The minimum number of iterations to be done (ITMIN).
8. The maximum number of iterations (ITMAX).
9. The convergence parameter (CONCRT).
10. Relaxation coefficient (RELAX). Not much is known about the relaxation behavior of this program.
11. Number of grid points in the transverse grid (NX).
12. Number of grid points in the longitudinal grid (MZ).
13. Number of paths whose time length is to be calculated (JTIMES).
14. The distance from centerline to initial points of interest for time calculation (XT(J)).

15. The initial point of the section for which residence times are calculated (ZBEG).

16. The final point of the section for which residence times are calculated (ZEND).

17. Printout code (IPRINT) equals 1 if the values of stream function, velocities, and vorticities at each grid point are to be printed, 0 otherwise.

18. The boundary condition code (IBC) if set to 0 for a no-slip boundary and 1 for uniform flow.

Figure 3-43 shows a typical listing of subroutine INPUT while Fig. 3-44 through Fig. 3-48 show the output from such a calculation.

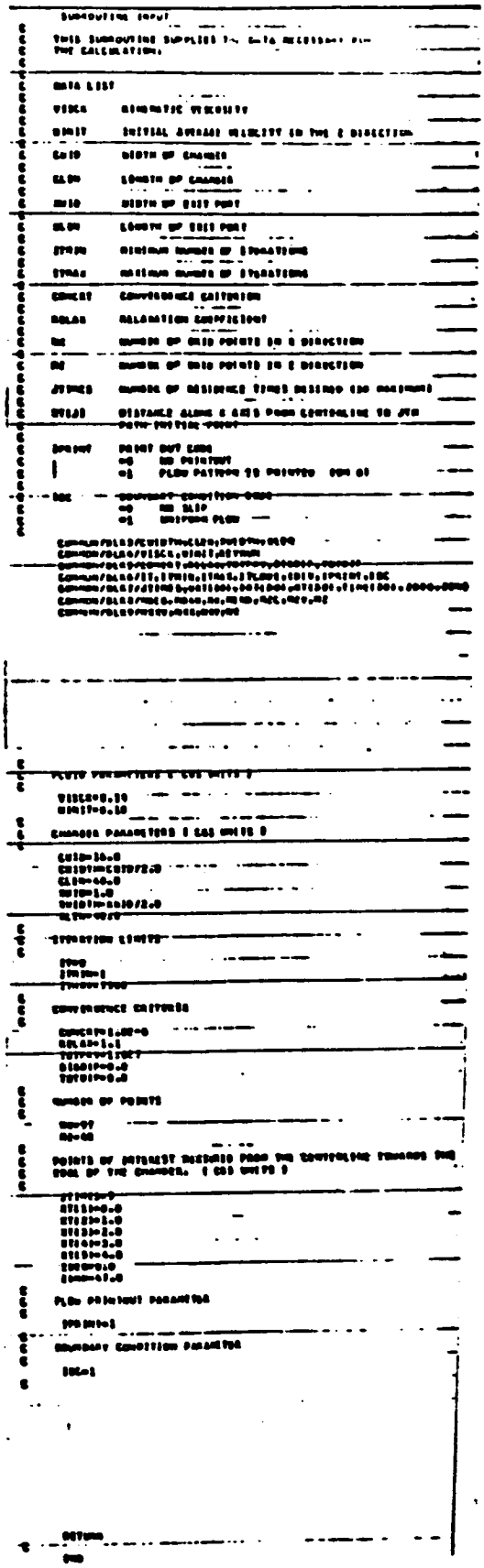


Figure 3-43. Listings of Subroutine INPUT

2989	0.107E-05	0.299E-03
2990	0.101E-05	0.303E-03
2991	0.107E-05	0.304E-03
2992	0.101E-05	0.310E-03
2993	0.101E-05	0.312E-03
2994	0.101E-05	0.318E-03
2995	0.101E-05	0.308E-03
2996	0.131E-05	0.312E-03
2997	0.131E-05	0.313E-03
2998	0.131E-05	0.307E-03
2999	0.131E-05	0.295E-03
3000	0.101E-05	0.295E-03
3001	0.131E-05	0.291E-03
3002	0.131E-05	0.293E-03
3003	0.131E-05	0.287E-03
3004	0.101E-05	0.281E-03
3005	0.954E-06	0.286E-03

Figure 3-44. The progress of the calculation towards convergence is printed often every iteration. The parameters printed are iteration number (IT), largest difference at any point (BIGDIF), and sum of differences (TOTDIF).

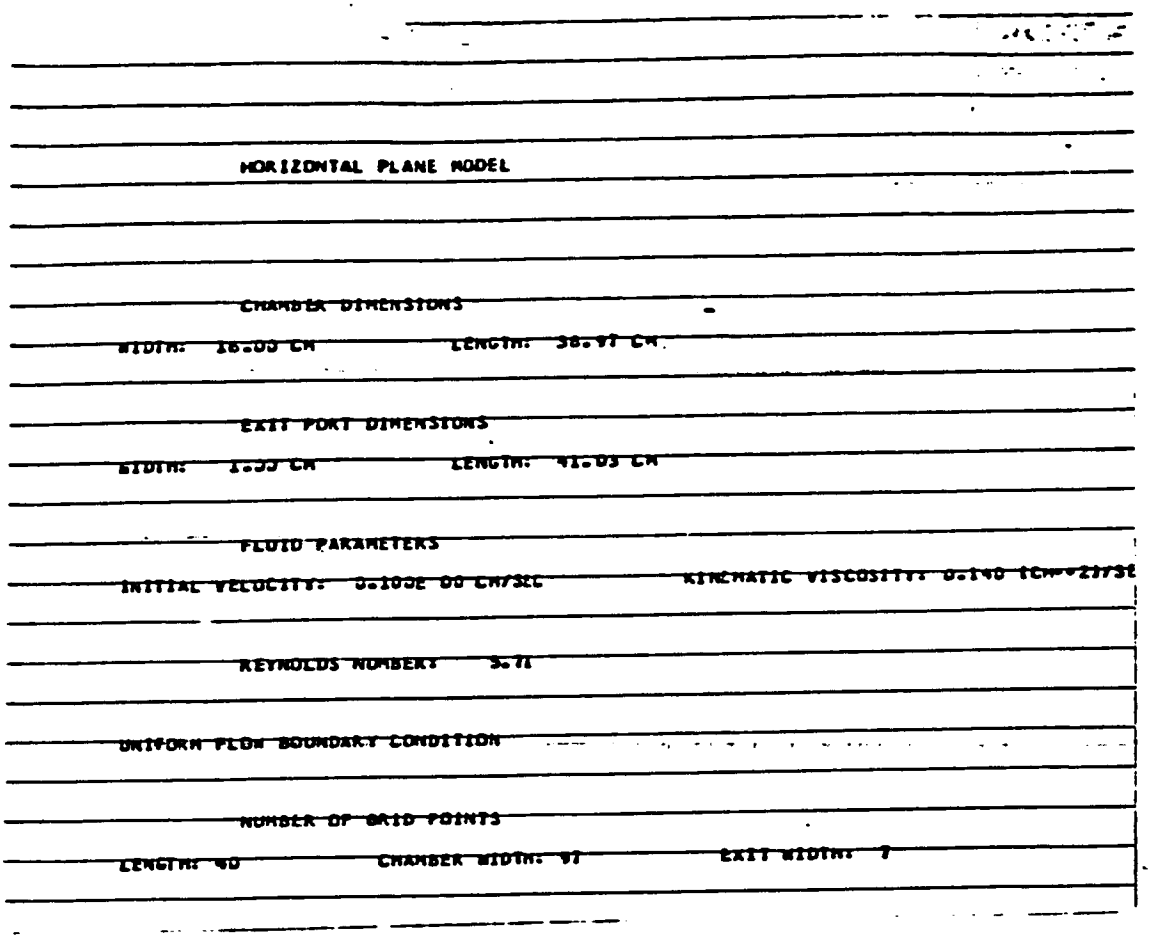


Figure 3-45. Listing of parameters describing computation. Some parameters may have been rounded off during the calculation.

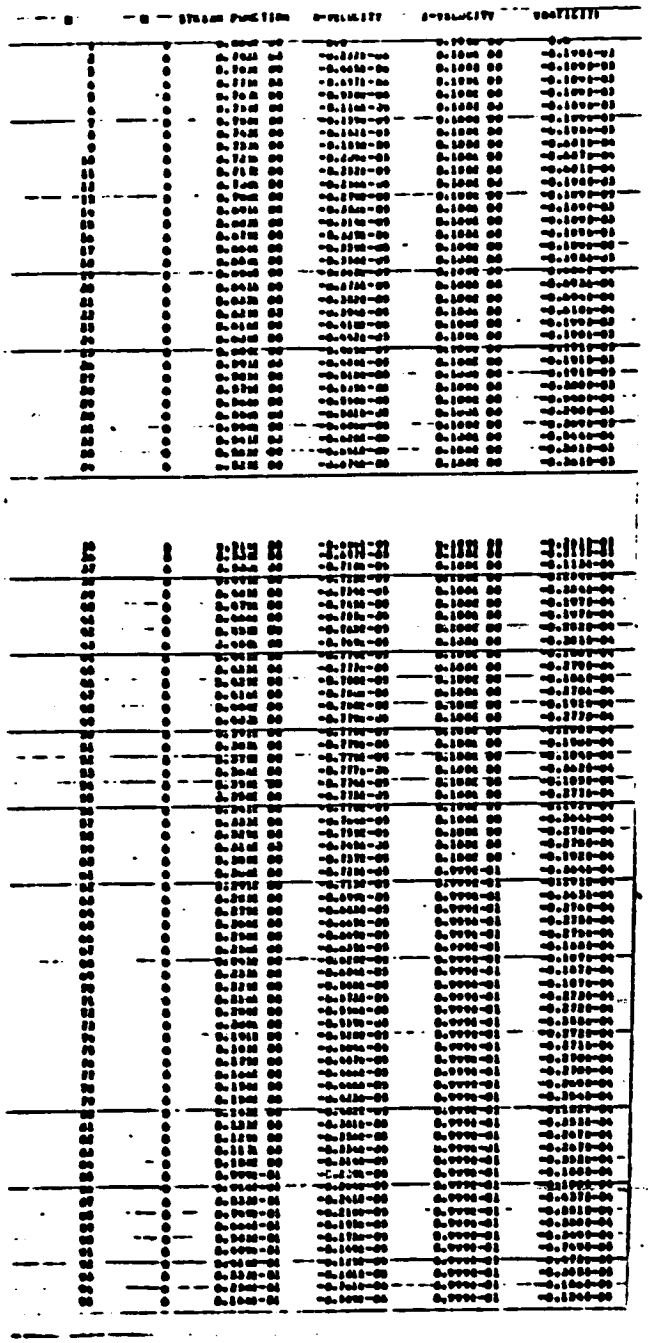


Figure 3-46. Listing of output in the chamber. The X grid point number (N), Z grid point number (M), stream function, velocity components, and vorticity are listed.

N	M	STREAM FUNCTION	R-VELOCITY	Z-VELOCITY	VORTICITY
1	37	0.800E 00	0.0	0.237E 01	0.0
2	37	0.603E 00	-0.271E-04	0.230E 01	-0.158E 01
3	37	0.416E 00	-0.449E-04	0.210E 01	-0.316E 01
4	37	0.252E 00	-0.473E-04	0.178E 01	-0.473E 01
5	37	0.121E 00	-0.343E-04	0.132E 01	-0.631E 01
6	37	0.329E-01	-0.130E-04	0.722E 00	-0.789E 01
7	37	0.0	0.0	0.0	-0.947E 01

N	M	STREAM FUNCTION	R-VELOCITY	Z-VELOCITY	VORTICITY
1	38	0.800E 00	0.0	0.237E 01	0.0
2	38	0.603E 00	-0.217E-03	0.230E 01	-0.158E 01
3	38	0.416E 00	-0.397E-03	0.210E 01	-0.316E 01
4	38	0.252E 00	-0.502E-03	0.178E 01	-0.474E 01
5	38	0.120E 00	-0.495E-03	0.131E 01	-0.632E 01
6	38	0.328E-01	-0.340E-03	0.722E 00	-0.789E 01
7	38	0.0	0.0	0.0	-0.945E 01

N	M	STREAM FUNCTION	R-VELOCITY	Z-VELOCITY	VORTICITY
1	39	0.800E 00	0.0	0.238E 01	0.0
2	39	0.602E 00	-0.189E-03	0.231E 01	-0.160E 01
3	39	0.415E 00	-0.351E-03	0.211E 01	-0.320E 01
4	39	0.250E 00	-0.454E-03	0.178E 01	-0.480E 01
5	39	0.119E 00	-0.460E-03	0.131E 01	-0.640E 01
6	39	0.315E-01	-0.327E-03	0.711E 00	-0.800E 01
7	39	0.0	0.0	0.0	-0.907E 01

N	M	STREAM FUNCTION	R-VELOCITY	Z-VELOCITY	VORTICITY
1	40	0.800E 00	0.0	0.238E 01	0.0
2	40	0.602E 00	0.0	0.231E 01	-0.160E 01
3	40	0.415E 00	0.0	0.211E 01	-0.320E 01
4	40	0.250E 00	0.0	0.178E 01	-0.480E 01
5	40	0.119E 00	0.0	0.131E 01	-0.640E 01
6	40	0.315E-01	0.0	0.711E 00	-0.800E 01
7	40	0.0	0.0	0.0	-0.907E 01

Figure 3-47. Listing of relevant flow variables in the exit port.

TRANSIT TIMES FROM 0.0 CM TO 45.13 CM

X-DISTANCE	TIME
0.0	352.27222
1.00	352.36401
2.00	355.14746
3.00	359.98633
4.00	366.74756

Figure 3-48. The transit times are printed for each initial X-distance.

3.2.6 SDL and CFD Models with Phoretic and Gravitational Motion of Aerosols and Droplets

The preceding sections have described the formulation of the Phase I ACPL Cloud Chamber Models. The present section begins the description of the Phase II models. The first two tasks in the Phase II simulation program were the modification of the SDL and CFD models to allow aerosol particles and cloud droplets to move across the chambers in response to phoretic forces created by gradients in gas temperature and composition and, optionally, in response to gravitational forces. These models were developed in response to the needs of the planned experiments on SDL-CFD comparisons in both zero-g and one-g environments, and on phoretic motion of aerosols in the CFD.

The basic model equations developed in Phase I include an equation for the movement of particles with the gas in the ACPL chambers. However, early attempts to follow motions of cloud droplets in the Phase I models gave physically unrealistic results, so they were deferred at that time. The problem was basically that the numerical method used gave rise to non-physical artifacts in the results. It has turned out that extensive changes in the computer programs were required to avoid such artifacts.

These Phase II SDL and CFD models in effect supplant the corresponding Phase I models. They give a more accurate simulation of the processes taking place in these cloud chambers and offer more options to the user. Anyone using the Phase I models should consider switching over to these models.

The input conditions required to use the Phoretic SDL Module are:

1. The thermal accommodation coefficient (ALPHA) and the condensation coefficient (BETA).
2. The aerosol distribution name (ADIST).
3. The number of classes of aerosol particles (NCLASS).

4. For a user generated aerosol distribution: the distribution of aerosol particle number concentration (NZERO) vs. critical supersaturation (SIGMAC), in exactly the same manner as given for the adiabatic expansion module,

or

For the CxS^K aerosol distribution function where S is critical supersaturation: the total number of particles per CC in the aerosol (ANBAR), the value of the exponent K in the distribution (AK), the lower bound on the supersaturation (SMIN), and the upper bound on the supersaturation (SMAX).

5. A user supplied identifier of up to 8 alphanumeric characters, used to label the output.

6. The number of grid points (NSPACE) used in the solution of heat conduction and diffusion equations. Can take any value from 3 to 21. The distance between SDL Chamber plates is divided into NSPACE-1 regions of height DZ. The SDL grid spacing (SDLHT).

7. Time at the beginning of the experiment (TMZERO), time at the end of the experiment (TIMEND), time step for integration of model equation (DELTAT), and time interval at which printed output is desired (TIMOUT), all in seconds.

8. Initial chamber temperature (both plates are assumed to be at temperature TZERO at time TMZERO), (TZERO) in ^{o}K, and initial chamber pressure (PZERO) in millibars.

9. The duration of the plate temperature ramp (TMRAMP) in seconds, and the ramp rates of the bottom and top plates (DTW1 and DTW2, respectively) in ^{o}K.

10. Time during which chamber pressure is controlled (TIMEXP), in seconds, and rate of change of chamber pressure (DPDT).

11. KGRAV is set to zero for zero-g experiment simulation, or KGRAV is set to one for one-g experiment simulation.

12. A two-digit integer (IOPTN) specifies printed output options. The permitted values are 0, 1, 10, or 11.

    If the first (tens) digit is:

    one - a table of temperatures, mixing ratios, supersaturations, and concentrations of activited drops or a function of position in the chamber is printed at each output point.

    zero - only the chamber plate temperatures, the supersaturation at the median plane of the chamber, and the total number of activated drops per square cm of plate area are printed.

    If the second (units) digit is:

    one - a table of droplet concentrations vs. drop size and position in the chamber is printed

    zero - no droplet information is printed.

The input stream for the Phoretic Static Diffusion Liquid Module consists of parameters delineated in Figure 3-36. These parameters are input using punched cards. The format of the data cards is described in Figure 3-37. Note that more than one experiment may be run at the same time by submitting multiple input data sets as described in Section 3.3.

3.2.6.1 Phoretic Static Diffusion Liquid Experiment Example

Two examples are given to illustrate the simulation of the Phoretic Static Diffusion Liquid Experiment. The listings of the input data cards is given in Figures 3-38 and 3-40, with the corresponding output listings shown in Figures 3-39 and 3-41.

Parameters	Units
Experiment name	(Designated name for the Phoretic Static Diffusion Liquid Experiment)
Thermal accommodation coefficient	
Condensation coefficient	
Aerosol distribution name	
Number of particle classes	
Number of particle classes for each class:	
Number of particles	
Critical supersaturation	
Number of particles	
Exponent (K)	
Lower bound on supersaturation	
Upper bound on supersaturation	
User supplied output identifier	
Number of grid points	
Grid spacing	centimeters
Start time	seconds
Finish time	seconds
Integration time step	seconds
Output time increment	seconds

Figure 3-36. Input Conditions for Phoretic Static Diffusion Models

Parameters	Units
Initial chamber temperature	degrees K
Initial chamber pressure	millibars
Duration of plate temperature ramp	seconds
Temperature rate change for bottom plate	degrees K/second
Temperature rate change for top plate	degrees K/second
Time during which chamber pressure is controlled	seconds
Rate of change of chamber pressure	
Gravity option	
Printed output option	

Figure 3-36. Input Conditions for Phoretic Static Diffusion Module (Cont.)

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment option	A8	PHOR SDL
2	1-10	Thermal accommodation coefficient	F10-5	
2	11-20	Condensation coefficient	F10-5	
3	1-8	Aerosol distribution name There are two options: N vs SC — User-generated distribution, number concentration vs critical supersaturation. C*S to K — Aerosol number concentration follows C*S**K distribution where S is critical supersaturation.	A8	Right justified in field
4	1-5	Number of particle classes – M	I10	Right justified in field
I+4	1-10	Number of particles in the Ith class	F10.5	
I+4	11-20	Critical supersaturation of the Ith class (I = 1, 2, 3, . . ., M)		Actual value, not percent
M+4	1-10	Total number of particles per CC in the aerosol	F10.5	
M+4	11-20	Value of the exponent K in the distribution	F10.5	
M+4	21-30	Lower bound on the supersaturation	F10.5	
M+4	31-40	Upper bound on the supersaturation	F10.5	
M+5	1-8	User supplied name for output identification	A8	
M+6	1-5	Number of grid points	I10	Right justified in field
M+6	11-20	Grid spacing	F10.5	
M+7	1-10	Start time	F10.5	
M+7	11-20	Finish time	F10.5	
M+7	21-30	Integration time step	F10.5	
M+7	31-40	Output time increment	F10.5	

Figure 3-37. Format of Input Data Cards for Phoretic Static Diffusion Liquid Simulation Run

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
M+8	1-10	Initial chamber temperature (Both plates are assumed to be at temperature TZERO at time TMZERO)	F10.5	
M+8	11-20	Initial chamber pressure	F10.5	
M+9	1-10	Plate temperature ramp duration	F10.5	
M+9	11-20	Bottom plate ramp rate	F10.5	
M+9	21-30	Top plate ramp rate	F10.5	
M+10	1-10	Time during which chamber pressure is controlled	F10.5	
M+10	11-20	Rate of change of chamber pressure	F10.5	
M+11	10	0 for zero-g experiment simulation 1 for one-g experiment simulation	I10	
M+12		Specifies printed output options	I10	
	9	1 - a table of temperature, mixing ratios, supersaturations, and concentrations of activated drops as a function of position in the chamber is printed at each output point.		
	9	0 - only the chamber plate temperatures, the supersaturation at the median plane of the chamber, and the total number of activated drops per sq cm of plate area are printed.		
	10	1 - a table of droplet concentrations vs. drop size and position in the chamber is printed.		
	10	0 - no droplet information is printed.		

(F10.5 is standard FOTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-37. Format of Input Data Cards for Phoretic Static Diffusion Liquid Simulation Run (Cont.)

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
     SDL
   1.           .03
 N VS SC
         6
  25.           .002
 100.           .004
 125.           .006
 125.           .008
 100.           .009
  25.           .01
TEST 2
        11   2.
   0.       100.          .5       2.
 293.15    1000.
  50.           .04       -.04
   0.           0.
         1
        10
STOP SIM
```

Figure 3-38. Input Card Images of Phoretic Static Diffusion Experiment Run - Example 1

```
INPUT PARAMETERS FOR SOL EXPERIMENT TEST 2

INITIAL CHAMBER TEMPERATURE   293.150 DEG K
INITIAL CHAMBER PRESSURE     1000.000 MB
PLATE TEMP RAMP DURATION       50.000 SEC
TOP PLATE RAMP RATE             0.040 DEG/SEC
BOTTOM PLATE RAMP RATE         -0.040 DEG/SEC
EXPANSION DURATION              0.0   SEC
EXPANSION RATE                  0.0   MB/SEC
EXPERIMENT DURATION            50.000 SEC

THIS IS A 1-G EXPERIMENT

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=11

INDEX  POSITION        VOLUME          AREA
    1   0.0       0.10000D 00    0.10000D 01
    2   0.20000   0.20000D 00    0.10000D 01
    3   0.40000   0.20000D 00    0.10000D 01
    4   0.60000   0.20000D 00    0.10000D 01
    5   0.80000   0.20000D 00    0.10000D 01
    6   1.00000   0.20000D 00    0.10000D 01
    7   1.20000   0.20000D 00    0.10000D 01
    8   1.40000   0.20000D 00    0.10000D 01
    9   1.60000   0.20000D 00    0.10000D 01
   10   1.80000   0.20000D 00    0.10000D 01
   11   2.00000   0.10000D 00

AEROSOL/DROPLET PARAMETERS
AEROSOL DISTRIBUTION IS  N VS SC

ACCOMMODATION COEFF          1.000
CONDENSATION COEFF           0.030

NUMBER OF DROPLET CLASSES=  6

CLASS    NO/CC     CRIT SSAT   CRIT RADIUS   INIT RADIUS          A             B
    1    25.00      0.00200      0.35829      0.20686   1.07487D-07   4.59938D-17
    2   100.00      0.00400      0.17914      0.10343   1.07487D-07   1.14985D-17
    3   125.00      0.00600      0.11943      0.06895   1.07487D-07   5.11042D-18
    4   125.00      0.00800      0.08957      0.05171   1.07487D-07   2.87461D-18
    5   100.00      0.00900      0.07962      0.04597   1.07487D-07   2.27130D-18
    6    25.00      0.01000      0.07166      0.04137   1.07487D-07   1.83975D-18

TIME=   2.00 SEC          PRESSURE=1000.00 MB

  J      TEMP V MIX RAT L MIX RAT   SUPERSAT ACT DROPS
         DEG C      G/KG      G/KG    PERCENT   PER CC
  1     20.080  14.96369 0.0000015    0.00001     0.0
  2     20.056  14.94137 0.0000015    0.00654     0.0
```

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1

3	20.037	14.92390	0.0000015	0.00845	0.0
4	20.022	14.90899	0.0000015	0.00725	0.0
5	20.011	14.89838	0.0000015	0.00417	0.0
6	20.000	14.88793	0.0000015	0.00023	0.0
7	19.990	14.87748	0.0000014	-0.00370	0.0
8	19.978	14.86590	0.0000014	-0.00676	0.0
9	19.963	14.85203	0.0000014	-0.00797	0.0
10	19.945	14.83463	0.0000014	-0.00617	0.0
11	19.920	14.81241	0.0	0.00001	0.0

TIME= 4.00 SEC PRESSURE=1000.00 MB

J	TEMP V MIX RAT L MIX RAT			SUPERSAT	ACT DROPS
	DEG C	G/KG	G/KG	PERCENT	PER CC
1	20.160	15.03985	0.0000015	0.00002	0.0
2	20.119	15.00266	0.0000015	0.00804	0.0
3	20.084	14.96924	0.0000015	0.01086	0.0
4	20.054	14.94014	0.0000015	0.00887	0.0
5	20.026	14.91354	0.0000015	0.00637	0.0
6	20.000	14.88819	0.0000015	0.00162	0.0
7	19.974	14.86288	0.0000014	-0.00318	0.0
8	19.947	14.83636	0.0000014	-0.00687	0.0
9	19.916	14.80741	0.0000014	-0.00831	0.0
10	19.881	14.77479	0.0000014	-0.00697	0.0
11	19.840	14.73729	0.0	0.00002	0.0

TIME= 6.00 SEC PRESSURE=1000.00 MB

J	TEMP V MIX RAT L MIX RAT			SUPERSAT	ACT DROPS
	DEG C	G/KG	G/KG	PERCENT	PER CC
1	20.240	15.11635	0.0000015	0.00003	0.0
2	20.183	15.06332	0.0000015	0.00941	0.0
3	20.132	15.01528	0.0000015	0.01317	0.0
4	20.086	14.97100	0.0000015	0.01275	0.0
5	20.042	14.92924	0.0000015	0.00953	0.0
6	20.000	14.88877	0.0000015	0.00481	0.0
7	19.958	14.84834	0.0000014	-0.00017	0.0
8	19.915	14.80674	0.0000014	-0.00422	0.0
9	19.868	14.76271	0.0000014	-0.00622	0.0
10	19.817	14.71504	0.0000014	-0.00512	0.0
11	19.760	14.66251	0.0	0.00003	0.0

TIME= 8.00 SEC PRESSURE=1000.00 MB

J	TEMP V MIX RAT L MIX RAT			SUPERSAT	ACT DROPS
	DEG C	G/KG	G/KG	PERCENT	PER CC
1	20.320	15.19319	0.0000015	0.00005	0.0
2	20.247	15.12494	0.0000015	0.01143	0.0
3	20.180	15.06169	0.0000015	0.01664	0.0
4	20.118	15.00222	0.0000015	0.01720	0.0
5	20.058	14.94525	0.0000015	0.01455	0.0
6	20.000	14.88969	0.0000015	0.01002	0.0
7	19.942	14.83405	.0000015	.00488	0.0000

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

8	19.883	14.77743	0.0000014	0.00028	0.0
9	19.820	14.71834	0.0000014	-0.00269	0.0
10	19.753	14.65562	0.0000014	-0.00305	0.0
11	19.680	14.58806	0.0	0.00005	0.0

TIME= 10.00 SEC PRESSURE=1000.01 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.400	15.27037	0.0000015	0.00006	0.0
2	20.311	15.18691	0.0000015	0.01419	0.0
3	20.228	15.10844	0.0000015	0.02143	0.0
4	20.150	15.03379	0.0000015	0.02339	0.0
5	20.075	14.96170	0.0000015	0.02158	0.0
6	20.001	14.89094	0.0000015	0.01735	0.0
7	19.927	14.82028	0.0000015	0.01198	0.0
8	19.851	14.74848	0.0000015	0.00660	0.0
9	19.772	14.67431	0.0000014	0.00225	0.0
10	19.689	14.59653	0.0000014	-0.00018	0.0
11	19.600	14.51396	0.0	0.00006	0.0

TIME= 12.00 SEC PRESSURE=1000.01 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.480	15.34790	0.0000015	0.00007	0.0
2	20.375	15.24922	0.0000015	0.01768	0.0
3	20.277	15.15555	0.0000015	0.02755	0.0
4	20.182	15.06570	0.0000016	0.03136	0.0
5	20.091	14.97845	0.0000015	0.03065	0.0
6	20.001	14.89255	0.0000015	0.02683	0.0
7	19.911	14.80676	0.0000015	0.02116	0.0
8	19.819	14.71987	0.0000015	0.01476	0.0
9	19.725	14.63062	0.0000015	0.00860	0.0
10	19.625	14.53779	0.0000015	0.00350	0.0
11	19.520	14.44019	0.0	0.00008	0.0

TIME= 14.00 SEC PRESSURE=1000.01 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.560	15.42578	0.0000015	0.00009	0.0
2	20.440	15.31189	0.0000015	0.02191	0.0
3	20.325	15.20301	0.0000016	0.03500	0.0
4	20.214	15.09798	0.0000016	0.04109	0.0
5	20.107	14.99556	0.0000016	0.04178	0.0
6	20.001	14.89451	0.0000016	0.03849	0.0
7	19.895	14.79360	0.0000015	0.03245	0.0
8	19.787	14.69160	0.0000015	0.02478	0.0
9	19.677	14.58727	0.0000015	0.01639	0.0
10	19.562	14.47938	0.0000015	0.00800	0.0
11	19.440	14.36675	0.0	0.00010	0.0

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

TIME= 16.00 SEC PRESSURE=1000.02 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.640	15.50400	0.0000015	0.00010	0.0
2	20.504	15.37490	0.0000015	0.02688	0.0
3	20.373	15.25082	0.0000016	0.04378	0.0
4	20.247	15.13052	0.0000016	.05260	.0000
5	20.123	15.01302	0.0000016	0.05495	0.0
6	20.001	14.89683	0.0000016	0.05229	0.0
7	19.879	14.78079	0.0000016	0.04585	0.0
8	19.756	14.66369	0.0000016	0.03668	0.0
9	19.629	14.54427	0.0000015	0.02564	0.0
10	19.498	14.42131	0.0000015	0.01333	0.0
11	19.360	14.29365	0.0	0.00012	0.0

TIME= 18.00 SEC PRESSURE=1000.02 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.720	15.58257	0.0000015	0.00011	0.0
2	20.568	15.43827	0.0000016	0.03257	0.0
3	20.421	15.29899	0.0000016	0.05387	0.0
4	20.279	15.16359	0.0000017	0.06585	0.0
5	20.140	15.03083	0.0000017	0.07017	0.0
6	20.002	14.89949	0.0000017	0.06827	0.0
7	19.864	14.76834	0.0000017	0.06137	0.0
8	19.724	14.63612	0.0000016	0.05047	0.0
9	19.581	14.50162	0.0000016	0.03635	0.0
10	19.434	14.36358	0.0000015	0.01950	0.0
11	19.280	14.22098	0.0	0.00015	0.0

TIME= 20.00 SEC PRESSURE=1000.02 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.900	15.66149	0.0000015	0.00013	0.0
2	20.632	15.50200	0.0000016	0.03898	0.0
3	20.469	15.34751	0.0000017	0.06527	0.0
4	20.311	15.19693	0.0000018	0.08086	0.0
5	20.156	15.04901	0.0000018	0.08743	0.0
6	20.002	14.90252	0.0000018	0.08641	0.0
7	19.848	14.75623	0.0000017	0.07901	0.0
8	19.692	14.60890	0.0000017	0.06616	0.0
9	19.533	14.45930	0.0000016	0.04854	0.0
10	19.370	14.30618	0.0000015	0.02652	0.0
11	19.200	14.14844	0.0	0.00018	0.0

TIME= 22.00 SEC PRESSURE=1000.03 MB

J	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	20.980	15.74076	0.0000015	0.00014	0.0

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

2	20.696	15.56608	0.0000016	0.04610	0.0
3	20.518	15.39639	0.0000018	0.07796	0.0
4	20.344	15.23062	0.0000019	0.09761	0.0
5	20.172	15.06753	0.0000019	0.10673	0.0
6	20.002	14.90599	0.0000019	0.10673	0.0
7	19.832	14.74447	0.0000018	0.09878	0.0
8	19.661	14.58203	0.0000018	0.08375	0.0
9	19.486	14.41732	0.0000017	0.06222	0.0
10	19.306	14.24512	0.0000015	0.03440	0.0
11	19.120	14.07633	0.0	0.00021	0.0

TIME= 24.00 SEC PRESSURE=1000.04 MB

J	TEMP V MIX RAT L MIX RAT SUPERSAT ACT DROPS				
	DEG C	G/KG	G/KG	PERCENT	PER CC
1	20.960	15.82029	0.0000015	.00016	.0000
2	20.760	15.63052	0.0000017	0.05392	0.0
3	20.566	15.44563	0.0000018	0.09194	0.0
4	20.376	15.26467	0.0000020	0.11609	0.0
5	20.189	15.08642	0.0000021	0.12805	0.0
6	20.003	14.90962	0.0000021	0.12922	0.0
7	19.817	14.73306	0.0000020	0.12069	0.0
8	19.629	14.55550	0.0000019	0.10326	0.0
9	19.438	14.37569	0.0000017	0.07739	0.0
10	19.242	14.19239	0.0000016	0.04315	0.0
11	19.040	14.00455	0.0	0.00025	0.0

TIME= 26.00 SEC PRESSURE=1000.04 MB

J	TEMP V MIX RAT L MIX RAT SUPERSAT ACT DROPS				
	DEG C	G/KG	G/KG	PERCENT	PER CC
1	21.040	15.90036	0.0000015	0.00017	0.0
2	20.824	15.69531	0.0000017	0.06243	0.0
3	20.614	15.49523	0.0000019	0.10719	0.0
4	20.408	15.29908	0.0000021	0.13629	0.0
5	20.205	15.10565	0.0000023	0.15140	0.0
6	20.003	14.91371	0.0000023	0.15387	0.0
7	19.801	14.72201	0.0000022	0.14474	0.0
8	19.597	14.52931	0.0000020	0.12470	0.0
9	19.390	14.33439	0.0000018	0.09407	0.0
10	19.178	14.13600	0.0000016	0.05277	0.0
11	18.961	13.93309	0.0	0.00029	0.0

TIME= 28.00 SEC PRESSURE=1000.05 MB

J	TEMP V MIX RAT L MIX RAT SUPERSAT ACT DROPS				
	DEG C	G/KG	G/KG	PERCENT	PER CC
1	21.120	15.98070	0.0000015	0.00018	0.0
2	20.889	15.76047	0.0000017	0.07164	0.0
3	20.663	15.54518	0.0000021	0.12371	0.0
4	20.441	15.33385	0.0000024	0.15821	0.0
5	20.222	15.12525	0.0000026	0.17678	0.0
6	20.004	14.91815	0.0000026	0.18070	0.0

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

7	19.786	14.71130	0.0000025	0.17094	0.0
8	19.566	14.50348	0.0000022	0.14807	0.0
9	19.343	14.29344	0.0000019	0.11228	0.0
10	19.115	14.07993	0.0000017	0.06327	0.0
11	18.881	13.86196	0.0	0.00034	0.0

TIME= 30.00 SEC PRESSURE=1000.06 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.200	16.06139	0.0000015	0.00020	0.0
2	20.953	15.82568	0.0000018	0.06153	0.0
3	20.711	15.59550	0.0000022	0.14148	0.0
4	20.473	15.36858	0.0000027	0.18184	0.0
5	20.238	15.14520	0.0000031	0.20416	0.0
6	20.004	14.92294	0.0000032	0.20969	0.0
7	19.770	14.70094	0.0000029	0.19928	0.0
8	19.534	14.47798	0.0000025	0.17339	0.0
9	19.295	14.25282	0.0000021	0.13201	0.0
10	19.051	14.02420	0.0000017	0.07467	0.0
11	18.801	13.79116	0.0	0.00040	0.0

TIME= 32.00 SEC PRESSURE=1000.07 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.280	16.14244	0.0000015	0.00021	0.0
2	21.017	15.89186	0.0000019	0.09209	0.0
3	20.759	15.64617	0.0000024	0.16050	0.0
4	20.506	15.40447	0.0000032	0.20715	0.0
5	20.255	15.16551	0.0000040	0.23356	0.0
6	20.005	14.92808	0.0000043	0.24085	0.0
7	19.755	14.69093	0.0000038	0.22978	0.0
8	19.503	14.45283	0.0000030	0.20066	0.0
9	19.247	14.21254	0.0000023	0.15329	0.0
10	18.987	13.96880	0.0000018	0.08697	0.0
11	18.721	13.72068	0.0	0.00046	0.0

TIME= 34.00 SEC PRESSURE=1000.07 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.360	16.22385	0.0000015	0.00022	0.0
2	21.081	15.95809	0.0000019	0.10332	0.0
3	20.808	15.69721	0.0000027	0.18075	0.0
4	20.538	15.44031	0.0000042	0.23415	0.0
5	20.271	15.18618	0.0000061	0.26495	25.000
6	20.005	14.93358	0.0000068	0.27417	25.000
7	19.739	14.68128	0.0000055	0.26244	25.000
8	19.471	14.42803	0.0000038	0.22588	0.0
9	19.200	14.17259	0.0000025	0.17612	0.0
10	18.923	13.91373	0.0000018	0.10017	0.0
11	18.641	13.65052	0.0	0.00052	0.0

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

TIME= 36.00 SEC PRESSURE=1000.08 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.440	16.30562	0.0000015	0.00024	0.0
2	21.144	16.02469	0.0000020	0.11520	0.0
3	20.956	15.74861	0.0000032	0.20222	0.0
4	20.571	15.47652	0.0000064	0.26282	25.000
5	20.288	15.20720	0.0000114	0.29831	25.000
6	20.006	14.93943	0.0000134	0.30963	25.000
7	19.724	14.67196	0.0000100	0.29723	25.000
8	19.440	14.40356	0.0000055	0.26107	25.000
9	19.152	14.13299	0.0000030	0.20051	0.0
10	18.860	13.85898	0.0000019	0.11429	0.0
11	18.561	13.58068	0.0	0.00060	0.0

TIME= 38.00 SEC PRESSURE=1000.09 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.520	16.38775	0.0000015	0.00025	0.0
2	21.210	16.09166	0.0000021	0.12772	0.0
3	20.905	15.80037	0.0000040	0.22488	0.0
4	20.603	15.51308	0.0000118	0.29310	25.000
5	20.304	15.22858	0.0000258	0.33361	25.000
6	20.007	14.94563	0.0000312	0.34719	25.000
7	19.708	14.66300	0.0000223	0.33414	25.000
8	19.408	14.37944	0.0000096	0.29419	25.000
9	19.105	14.09371	0.0000037	0.22644	0.0
10	18.796	13.80456	0.0000020	0.12932	0.0
11	18.481	13.51108	.0000000	.00068	.0000

TIME= 40.00 SEC PRESSURE=1000.10 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.600	16.47024	0.0000015	0.00027	0.0
2	21.274	16.15899	0.0000023	0.14085	0.0
3	20.953	15.85249	0.0000057	0.24867	25.000
4	20.636	15.55001	0.0000260	0.32494	25.000
5	20.321	15.25031	0.0000609	0.37075	25.000
6	20.007	14.95218	0.0000737	0.38677	25.000
7	19.693	14.65438	0.0000528	0.37309	25.000
8	19.377	14.35566	0.0000207	0.32919	25.000
9	19.057	14.05477	0.0000051	0.25390	25.000
10	18.732	13.75047	0.0000022	0.14526	0.0
11	18.401	13.44196	0.0	0.00077	0.0

TIME= 42.00 SEC PRESSURE=1000.11 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.680	16.55310	0.0000015	0.00028	0.0
2	21.338	16.22668	0.0000024	0.15459	0.0

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

3	21.001	15.00497	0.0000094	0.27359	25.000
4	20.668	15.58729	0.0000599	0.35833	25.000
5	20.338	15.27240	0.0000019	0.40080	0.0
6	20.008	14.95908	0.0001354	0.42834	25.000
7	19.678	14.64609	0.0001560	0.41395	25.000
8	19.346	14.33220	0.0001606	0.36592	50.000
9	19.010	14.01615	0.0000084	0.28277	25.000
10	18.668	13.69669	0.0000024	0.16206	0.0
11	18.321	13.37308	0.0	0.00087	0.0

TIME= 44.00 SEC PRESSURE=1000.13 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.760	16.63633	0.0000015	0.00030	0.0
2	21.403	16.29473	0.0000026	0.16893	0.0
3	21.050	15.95781	0.0000188	0.29962	25.000
4	20.701	15.62492	0.0000017	0.39324	0.0
5	20.355	15.29483	0.0001391	0.45048	125.000
6	20.009	14.96631	0.0002769	0.47173	125.000
7	19.663	14.63814	0.0002966	0.45673	125.000
8	19.314	14.30908	0.0002102	0.40446	25.000
9	18.962	13.97786	0.0001147	0.31305	50.000
10	18.605	13.64324	0.0000026	0.17970	0.0
11	18.241	13.30451	0.0	0.00098	0.0

TIME= 46.00 SEC PRESSURE=1000.14 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.840	16.71992	0.0000015	0.00031	0.0
2	21.467	16.36315	0.0000029	0.18376	0.0
3	21.099	16.01101	0.0000413	0.32657	25.000
4	20.734	15.66290	0.0000025	0.42541	100.000
5	20.372	15.31760	0.0003034	0.48271	125.000
6	20.010	14.97398	0.0005309	0.51680	125.000
7	19.648	14.63053	0.0005275	0.50126	125.000
8	19.283	14.28620	0.0003645	0.44468	125.000
9	18.915	13.93981	.0002013	.34373	50.000
10	18.541	13.59010	0.0000029	0.19820	0.0
11	18.161	13.23625	0.0	0.00110	0.0

TIME= 48.00 SEC PRESSURE=1000.15 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	21.920	16.80388	0.0000015	0.00033	0.0
2	21.531	16.43193	0.0000033	0.19899	0.0
3	21.147	16.06456	0.0000014	0.35422	0.0
4	20.767	15.70121	0.0001081	0.46636	125.000
5	20.389	15.34068	0.0006468	0.53586	125.000
6	20.011	14.98176	0.0002172	0.56304	100.000

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

7	19.633	14.62320	0.0009365	0.54678	125.000
8	19.252	14.26377	0.0014169	0.48569	150.000
9	18.867	13.90222	0.0002715	0.37730	25.000
10	18.478	13.53727	0.0000713	0.21730	25.000
11	18.082	13.16831	0.0	0.00123	0.0

TIME= 50.00 SEC PRESSURE=1000.17 MB

J	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC
1	22.000	16.88820	0.0000015	0.00036	0.0
2	21.596	16.50106	0.0000040	0.21442	0.0
3	21.196	16.11843	0.0000016	0.36220	0.0
4	20.800	15.73983	0.0002877	0.50371	125.000
5	20.406	15.36405	0.0004761	0.57935	100.000
6	20.012	14.98989	0.0016714	0.60904	125.000
7	19.618	14.61614	0.0017451	0.59250	125.000
8	19.221	14.24155	0.0012505	0.52754	125.000
9	18.820	13.86483	0.0012663	0.41033	50.000
10	18.414	13.48473	0.0000775	0.23676	25.000
11	18.002	13.10068	0.0	0.00138	0.0

* END SIMULATION *

Figure 3-39. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 1 (Cont.)

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
     SDL
   1.          .03
C*S TO K
        20
 500.          1.          .002       .01
TEST 4
        11    2.
   0.        100.          .5         2.
 293.15     1000.
  50.          .04        -.04
   0.          0.
          0
          0
STOP SIM
```

Figure 3-40. Input Card Images of Phoretic Static Diffusion Experiment Run - Example 2

```
INPUT PARAMETERS FOR SDL EXPERIMENT TEST 4

INITIAL CHAMBER TEMPERATURE   293.150 DEG K
INITIAL CHAMBER PRESSURE     1000.000 MB
PLATE TEMP RAMP DURATION       50.000 SEC
TOP PLATE RAMP RATE             0.040 DEG/SEC
BOTTOM PLATE RAMP RATE         -0.040 DEG/SEC
EXPANSION DURATION              0.0   SEC
EXPANSION RATE                  0.0   MB/SEC
EXPERIMENT DURATION           100.000 SEC

THIS IS A 0-G EXPERIMENT

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=11

INDEX  POSITION        VOLUME              AREA
    1   0.0       0.10000D 00     0.10000D 01
    2   0.20000   0.20000D 00     0.10000D 01
    3   0.40000   0.20000D 00     0.10000D 01
    4   0.60000   0.20000D 00     0.10000D 01
    5   0.80000   0.20000D 00     0.10000D 01
    6   1.00000   0.20000D 00     0.10000D 01
    7   1.20000   0.20000D 00     0.10000D 01
    8   1.40000   0.20000D 00     0.10000D 01
    9   1.60000   0.20000D 00     0.10000D 01
   10   1.80000   0.20000D 00     0.10000D 01
   11   2.00000   0.10000D 00

AEROSOL/DROPLET PARAMETERS
AEROSOL DISTRIBUTION IS C*S TO K
  DISTRIBUTION PARAMETERS ARE
     C=  62500.00
     K=1.000
     SMIN= 0.200 PERCENT
     SMAX= 1.000 PERCENT
     TOTAL PARTICLE CONC=     500.00 PER CC

ACCOMMODATION COEFF              1.000
CONDENSATION COEFF               0.030
```

Figure 3-41. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 2

NUMBER OF DROPLET CLASSES= 20

CLASS	NO/CC	CRIT SSAT	CRIT RADIUS	INIT RADIUS	A	B
1	25.00	0.00240	0.29857	0.17238	1.07487D-07	3.19402D-17
2	25.00	0.00280	0.25592	0.14776	1.07487D-07	2.34662D-17
3	25.00	0.00320	0.22393	0.12929	1.07487D-07	1.79663D-17
4	25.00	0.00360	0.19905	0.11492	1.07487D-07	1.41956D-17
5	25.00	0.00400	0.17914	0.10343	1.07487D-07	1.14935D-17
6	25.00	0.00440	0.16286	0.09403	1.07487D-07	9.50286D-18
7	25.00	0.00480	0.14929	0.08619	1.07487D-07	7.98504D-18
8	25.00	0.00520	0.13780	0.07956	1.07487D-07	6.80382D-18
9	25.00	0.00560	0.12796	0.07388	1.07487D-07	5.86656D-18
10	25.00	0.00600	0.11943	0.06895	1.07487D-07	5.11042D-18
11	25.00	0.00640	0.11197	0.06464	1.07487D-07	4.49158D-18
12	25.00	0.00680	0.10538	0.06084	1.07487D-07	3.97870D-18
13	25.00	0.00720	0.09952	0.05746	1.07487D-07	3.54891D-18
14	25.00	0.00760	0.09429	0.05444	1.07487D-07	3.18517D-18
15	25.00	0.00800	0.08957	0.05171	1.07487D-07	2.87461D-18
16	25.00	0.00840	0.08531	0.04925	1.07487D-07	2.60736D-18
17	25.00	0.00880	0.08143	0.04701	1.07487D-07	2.37571D-18
18	25.00	0.00920	0.07789	0.04497	1.07487D-07	2.17362D-18
19	25.00	0.00960	0.07464	0.04310	1.07487D-07	1.99626D-18
20	25.00	0.01000	0.07166	0.04137	1.07487D-07	1.83975D-18

Figure 3-41. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 2 (Cont.)

```
TIME=   2.00 SEC          PRESSURE=1000.00 MB
  PLATE TEMPERATURES - TOP= 20.080, BOTTOM= 19.920
  MEDIAN PLANE SUPERSATURATION=    0.00023 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=   4.00 SEC          PRESSURE=1000.00 MB
  PLATE TEMPERATURES - TOP= 20.160, BOTTOM= 19.840
  MEDIAN PLANE SUPERSATURATION=    0.00162 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=   6.00 SEC          PRESSURE=1000.00 MB
  PLATE TEMPERATURES - TOP= 20.240, BOTTOM= 19.760
  MEDIAN PLANE SUPERSATURATION=    0.00481 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=   8.00 SEC          PRESSURE=1000.00 MB
  PLATE TEMPERATURES - TOP= 20.320, BOTTOM= 19.680
  MEDIAN PLANE SUPERSATURATION=    0.01002 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  10.00 SEC          PRESSURE=1000.01 MB
  PLATE TEMPERATURES - TOP= 20.400, BOTTOM= 19.600
  MEDIAN PLANE SUPERSATURATION=    0.01735 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  12.00 SEC          PRESSURE=1000.01 MB
  PLATE TEMPERATURES - TOP= 20.480, BOTTOM= 19.520
  MEDIAN PLANE SUPERSATURATION=    0.02683 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  14.00 SEC          PRESSURE=1000.01 MB
  PLATE TEMPERATURES - TOP= 20.560, BOTTOM= 19.440
  MEDIAN PLANE SUPERSATURATION=    0.03848 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  16.00 SEC          PRESSURE=1000.02 MB
  PLATE TEMPERATURES - TOP= 20.640, BOTTOM= 19.360
  MEDIAN PLANE SUPERSATURATION=    0.05229 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  18.00 SEC          PRESSURE=1000.02 MB
  PLATE TEMPERATURES - TOP= 20.720, BOTTOM= 19.280
  MEDIAN PLANE SUPERSATURATION=    0.06827 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  20.00 SEC          PRESSURE=1000.02 MB
  PLATE TEMPERATURES - TOP= 20.800, BOTTOM= 19.200
  MEDIAN PLANE SUPERSATURATION=    0.08641 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  22.00 SEC          PRESSURE=1000.03 MB
  PLATE TEMPERATURES - TOP= 20.880, BOTTOM= 19.120
  MEDIAN PLANE SUPERSATURATION=    0.10673 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  24.00 SEC          PRESSURE=1000.04 MB
  PLATE TEMPERATURES - TOP= 20.960, BOTTOM= 19.040
  MEDIAN PLANE SUPERSATURATION=    0.12922 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  26.00 SEC          PRESSURE=1000.04 MB
  PLATE TEMPERATURES - TOP= 21.040, BOTTOM= 18.960
  MEDIAN PLANE SUPERSATURATION=    0.15387 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  28.00 SEC          PRESSURE=1000.05 MB
  PLATE TEMPERATURES - TOP= 21.120, BOTTOM= 18.880
  MEDIAN PLANE SUPERSATURATION=    0.18070 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  30.00 SEC          PRESSURE=1000.06 MB
  PLATE TEMPERATURES - TOP= 21.200, BOTTOM= 18.800
  MEDIAN PLANE SUPERSATURATION=    0.20969 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  32.00 SEC          PRESSURE=1000.07 MB
  PLATE TEMPERATURES - TOP= 21.280, BOTTOM= 18.720
  MEDIAN PLANE SUPERSATURATION=    0.24086 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  34.00 SEC          PRESSURE=1000.07 MB
  PLATE TEMPERATURES - TOP= 21.360, BOTTOM= 18.640
  MEDIAN PLANE SUPERSATURATION=    0.27419 PERCENT
  NO OF ACT DROPS PER SQ CM=      0.0

TIME=  36.00 SEC          PRESSURE=1000.08 MB
  PLATE TEMPERATURES - TOP= 21.440, BOTTOM= 18.560
  MEDIAN PLANE SUPERSATURATION=    0.30968 PERCENT
  NO OF ACT DROPS PER SQ CM=     15.000

TIME=  38.00 SEC          PRESSURE=1000.09 MB
  PLATE TEMPERATURES - TOP= 21.520, BOTTOM= 18.480
  MEDIAN PLANE SUPERSATURATION=    0.34731 PERCENT
  NO OF ACT DROPS PER SQ CM=     40.000

TIME=  40.00 SEC          PRESSURE=1000.10 MB
  PLATE TEMPERATURES - TOP= 21.600, BOTTOM= 18.400
  MEDIAN PLANE SUPERSATURATION=    0.38700 PERCENT
  NO OF ACT DROPS PER SQ CM=     65.000

TIME=  42.00 SEC          PRESSURE=1000.11 MB
  PLATE TEMPERATURES - TOP= 21.680, BOTTOM= 18.320
  MEDIAN PLANE SUPERSATURATION=    0.42855 PERCENT
  NO OF ACT DROPS PER SQ CM=     90.000

TIME=  44.00 SEC          PRESSURE=1000.13 MB
  PLATE TEMPERATURES - TOP= 21.760, BOTTOM= 18.240
  MEDIAN PLANE SUPERSATURATION=    0.47156 PERCENT
  NO OF ACT DROPS PER SQ CM=    125.000
```

Figure 3-41. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 2 (Cont.)

```
TIME=  46.00 SEC          PRESSURE=1000.14 MB
  PLATE TEMPERATURES - TOP= 21.840, BOTTOM= 18.160
  MEDIAN PLANE SUPERSATURATION=   0.51543 PERCENT
  NO OF ACT DROPS PER SQ CM=   160.000

TIME=  48.00 SEC          PRESSURE=1000.15 MB
  PLATE TEMPERATURES - TOP= 21.920, BOTTOM= 18.080
  MEDIAN PLANE SUPERSATURATION=   0.55938 PERCENT
  NO OF ACT DROPS PER SQ CM=   195.000

TIME=  50.00 SEC          PRESSURE=1000.17 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.60251 PERCENT
  NO OF ACT DROPS PER SQ CM=   225.000

TIME=  52.00 SEC          PRESSURE=1000.17 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.62759 PERCENT
  NO OF ACT DROPS PER SQ CM=   260.000

TIME=  54.00 SEC          PRESSURE=1000.18 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.62804 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  56.00 SEC          PRESSURE=1000.18 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.61824 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  58.00 SEC          PRESSURE=1000.18 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.60488 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  60.00 SEC          PRESSURE=1000.19 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.59090 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  62.00 SEC          PRESSURE=1000.19 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.57752 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  64.00 SEC          PRESSURE=1000.19 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.56517 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  66.00 SEC          PRESSURE=1000.19 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.55387 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  68.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.54354 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  70.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.53407 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  72.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.52534 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  74.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.51726 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  76.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.50974 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  78.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.50273 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  80.00 SEC          PRESSURE=1000.20 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.49615 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  82.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.48996 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  84.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.48413 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  86.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.47861 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  88.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.47338 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000
```

Figure 3-41. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 2 (Cont.)

```
TIME=  90.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.46841 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  92.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.46367 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  94.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.45915 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  96.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.46657 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME=  98.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.46630 PERCENT
  NO OF ACT DROPS PER SQ CM=   265.000

TIME= 100.00 SEC          PRESSURE=1000.21 MB
  PLATE TEMPERATURES - TOP= 22.000, BOTTOM= 18.000
  MEDIAN PLANE SUPERSATURATION=   0.46321 PERCENT
  NO OF ACT DROPS PER SQ CM=   270.000
   * END SIMULATION *
```

Figure 3-41. Sample Output of the Phoretic Static Diffusion Liquid Experiment Simulation - Example 2 (Cont.)

The input conditions required to use the Phoretic CFD Module are:

1. The thermal accommodation coefficient (ALPHA) and the condensation coefficient (BETA).

2. The aerosol distribution name (ADIST).

3. The number of classes of aerosol particles (NCLASS).

4. For a user generated aerosol distribution: the distribution of aerosol particle number concentration (NZERO) vs. critical supersaturation (SIGMAC), in exactly the same manner as given for the adiabatic expansion module,

   or

   For the CxS^K aerosol distribution function where S is critical supersaturation: the total number of aprticles per CC in the aerosol (ANBAR), the value of the exponent K in the distribution (AK), the lower bound on the supersaturation (SMIN), and the upper bound on the supersaturation (SMAX).

5. A user supplied identifier of up to 8 alphanumeric characters, used to label the output.

6. The CFD Chamber length (CFDLEN), the CFD plate spacing (CFDHT), the CFD Chamber width (CFDWID), and the length of sample injection slit (SLITLN).

7. The distance from chamber entrance to start of wet-dry zone (start of wick surface on bottom plate, (XWTDRY), the distance to start of wet-wet zone (XWTWT), and the distance of sample injection point (XINJ).

8. The initial chamber temperature (TZERO) in degrees K, initial pressure (PZERO) in millibars (MB), the top plate temperature (TW1), and the bottom plate temperature (TW2).

9. The number of space grid points (NSPACE) used in the module, the saturator temperature for carrier gas flow (TSATUR), the saturator pressure for carrier gas flow (PSATUR), and the volume flow rate of carrier gas (CFLOW).

10. The number of grid points used for sample gas flow (NSAMPL), the sample gas terperature at injection point (TSAMPL), and the sample gas dew point temperature (TDSMPL).

11. The space increment in flow direction for integration of model equations (DX), and the space increment at which output is desired (DXOUT).

12. KGRAV is set to zero for zero-g experiment simulation or KGRAV is set to one for one-g experiment simulation.

13. A two-digit integer (JOPTN) specifies printed output options. The permitted values are 0, 1, 10, or 11.
    If the first (tens) digit is:
    one - a table of flow velocities, temperatures, mixing ratios, supersaturations, concentrations of activated drops and fluxes of activated drops as a function of position in the chamber is printed at each output point.
    zero - only the flow velocity and supersaturation along the median plane of the chamber, and the total flux of activated drops through the chamber are printed.
    If the second (units) digit is:
    one - a table of droplet concentrations vs. drop size and position in the chamber is printed.
    zero - no droplet information is printed.

The input stream for the Phoretic Continuous Flow Diffusion Module consists of parameters delineated in Figure 3-42. These parameters are input using punched cards. The format of the data cards is described in Figure 3-43. Note that more than one experiment may be run at the same time by submitting multiple input data sets as described in paragraph 3.3.

3.4.10 Phoretic Continuous Flow Diffusion Experiment Example

Examples are given to illustrate the simulation of the Phoretic Continuous Flow Diffusion Experiment. The listings of the input data cards are given in Figures 3-44 and 3-46. The corresponding output listings are shown in Figures 3-45 and 3-47.

Parameters	Units
Experiment Name	(Designated name for the Phoretic Continuous Flow Diffusion Experiment)
Thermal accommodation coefficient	
Condensation coefficient	
Aerosol distribution name	
Number of particle classes for each class:	
Number of particles	
Critical supersaturation	
Number of particles	
Exponent (K)	
Lower bound on supersaturation	
Upper bound on supersaturation	
User supplied name to label output	
CFD chamber length	CM
CFD plate spacing	CM
CFD chamber width	CM
Length of sample injection slit	CM
Distance from chamber entrance to start of wet-dry zone	
Distance to start of wet-wet zone	CM
Distance to sample injection point	CM
Initial chamber temperature	Degrees K
Initial chamber pressure	Millibars
Top plate temperature	Degrees K
Bottom plate temperature	Degrees K
Number of grid points for carrier gas flow	
Saturator temperature	Degrees K
Saturator pressure	Millibars
Volume flow rate for carrier gas	CC
Number of grid points for sample gas flow	
Sample gas temperature at injection point	Degrees K

Figure 3-42. Input Conditions for Phoretic Continuous Flow Diffusion Module

Parameters	Units
Sample gas dew point temperature at injection point	Degrees K
Space increment in flow direction for integration of equations	CM
Space increment for output	CM

Option to do a zero-g experiment simulation, or a one-g experiment simulation.

Printed output options.

Figure 3-42. Input Conditions for Phoretic Continuous Flow Diffusion Module (Cont.)

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment option	A8	PHOR CFD
2	1-10	Thermal accommodation coefficient	F10.5	
2	11-20	Condensation coefficient	F10.5	
3	1-8	Aerosol distribution name There are two options: N vs SC — User-generated distirbution, number concentration vs critical supersaturation. C*S to K — Aerosol number concentration follows C*S**K distribution where S is critical supersaturation.	A8	Right justified in field
4	1-5	Number of particle classes - M	I10	Right justified in field
I +4	1-10	Number of particles in the Ith class	F10.5	
I+4	11-20	Critical supersaturation of the Ith class (I = 1, 2, 3, . . ., M)		Actual value, not percent
M+4	1-10	Total number of particles per CC in the aerosol	F10.5	
M+4	11-20	Value of the exponent K in the distribution	F10.5	
M+4	21-30	Lower bound on the supersaturation	F10.5	
M+4	31-40	Upper bound on the supersaturation	F10.5	
M+5	1-8	User supplied name for output identification	A8	
M+6	1-10	CFD chamber length	F10.5	
M+6	11-20	CFD plate spacing	F10.5	
M+6	21-30	CFD chamber width	F10.5	
M+6	31-40	Length of sample injection slit	F10.5	
M+7	1-10	Distance from chamber entrance to start of wet-dry zone	F10.5	
M+7	11-20	Distance to start of wet-wet zone	F10.5	
M+7	21-30	Distance to sample injection point	F10.5	

Figure 3-43. Format of Input Data Cards for Phoretic Continuous Flow Diffusion Simulation Experiment

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
M+8	11-20	Initial chamber pressure	F10.5	
M+8	21-30	Top plate temperature	F10.5	
M+8	31-40	Bottom plate temperature	F10.5	
M+9	1-10	Number of grid points used for carrier gas flow	I10	Right justified in field
M+9	11-20	Saturator temperature	F10.5	
M+9	21-30	Saturator pressure	F10.5	
M+9	31-40	Volume flow rate of carrier gas	F10.5	
M+10	1-10	Number of grid points used for sample gas flow	I10	Right justified in field
M+10	11-20	Sample gas temperature at injection point	F20.5	
M+10	21-30	Sample gas dew point temperature	F10.5	
M+11	1-10	Space increment in flow direction for integration of model equations	F10.5	
M+11	11-20	Space increment at which output is desired	F10.5	
M+12	10	Zero for zero-g experiment simulation	I10	
		One for one-g experiment simulation	I10	
M+13		Specifies printed output options	I10	
	9	One - a table of flow velocities, temperatures, mixing ratios, supersaturations, concentrations of activated drops and fluxes of activated drops as a function of position in the chamber is printed at each output point.		

Figure 3-43. Format of Input Data Cards for Phoretic Continuous Flow Diffusion Simulation Experiment (Cont.)

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
M+13	9	Zero - only the flow velocity and supersatuation along the median plane of the chamber, and the total flux of activated drops through the chamber are printed.	I10	
	10	One - a table of droplet concentration versus drop size and position in the chamber is printed.		
	10	Zero - no droplet information is printed.		

(F10.5 is standard FORTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-43. Format of Input Data Cards for Phoretic Continuous Flow Diffusion Simulation Experiment (Cont.)

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
     CFD
   1.          .03
C*S TO K
        20
 500.          1.          .002       .01
TEST 1
  66.          2.         36.         12.
   3.          6.         15.
 293.15    1000.         295.15     291.15
         30 291.15    1000.          50.
          3 293.15     291.15
     .0625     3.
           1
           1
STOP SIM
```

Figure 3-44. Input Card Images of Phoretic Continuous Flow Diffusion Run - Example 1

```
INPUT PARAMETERS FOR CFD EXPERIMENT TEST 1

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=30

INDEX   POSITION          VOLUME              AREA
    1    0.0          0.344830-01      0.100000 01
    2    0.06897      0.689660-01      0.100000 01
    3    0.13793      0.689660-01      0.100000 01
    4    0.20690      0.689660-01      0.100000 01
    5    0.27586      0.689660-01      0.100000 01
    6    0.34483      0.689660-01      0.100000 01
    7    0.41379      0.689660-01      0.100000 01
    8    0.48276      0.689660-01      0.100000 01
    9    0.55172      0.689660-01      0.100000 01
   10    0.62069      0.689660-01      0.100000 01
   11    0.68966      0.689660-01      0.100000 01
   12    0.75862      0.689660-01      0.100000 01
   13    0.82759      0.689660-01      0.100000 01
   14    0.89655      0.689660-01      0.100000 01
   15    0.96552      0.689660-01      0.100000 01
   16    1.03448      0.689660-01      0.100000 01
   17    1.10345      0.689660-01      0.100000 01
   18    1.17241      0.689660-01      0.100000 01
   19    1.24138      0.689660-01      0.100000 01
   20    1.31034      0.689660-01      0.100000 01
   21    1.37931      0.689660-01      0.100000 01
   22    1.44828      0.689660-01      0.100000 01
   23    1.51724      0.689660-01      0.100000 01
   24    1.58621      0.689660-01      0.100000 01
   25    1.65517      0.689660-01      0.100000 01
   26    1.72414      0.689660-01      0.100000 01
   27    1.79310      0.689660-01      0.100000 01
   28    1.86207      0.689660-01      0.100000 01
   29    1.93103      0.689660-01      0.100000 01
   30    2.00000      0.344830-01

THIS IS A 1-G EXPERIMENT

CFD CHAMBER LENGTH          66.000 CM
CFD CHAMBER WIDTH           36.000 CM
PLATE SPACING                2.000 CM
INJECTION SLIT LENGTH       12.000 CM
START OF WET-DRY ZONE        3.000 CM
START OF WET-WET ZONE        6.000 CM
```

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1

```
TOP PLATE TEMPERATURE          295.150 DEG K
BOTTOM PLATE TEMPERATURE       291.150 DEG K
SATURATOR TEMPERATURE          291.150 DEG K
SATURATOR PRESSURE            1000.000 MB
CARRIER GAS FLOW RATE           50.000 CC/SEC
INITIAL GAS TEMPERATURE        293.150 DEG K
CHAMBER PRESSURE              1000.000 MB
INITIAL SUPERSATURATION        -11.752 PERCENT

HORIZONTAL INCREMENT             0.063 CM
OUTPUT SPACE INCREMENT           3.000 CM
SAMPLE INJECTION POINT          15.000 CM


OUTPUT AT X= 3.00 CM
  MEDIAN PLANE SUPERSATURATION=-11.4052 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.042 CM/SEC

OUTPUT AT X= 6.00 CM
  MEDIAN PLANE SUPERSATURATION=-11.3889 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.042 CM/SEC

OUTPUT AT X= 9.00 CM
  MEDIAN PLANE SUPERSATURATION= -1.3674 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.044 CM/SEC

OUTPUT AT X=12.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.3874 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.045 CM/SEC

OUTPUT AT X=15.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.0379 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.045 CM/SEC


AEROSOL SAMPLE INJECTED AT X=15.00

  SAMPLE GAS TEMPERATURE= 20.000 DEG C
  SAMPLE GAS DEW POINT T= 18.000 DEG C
  SAMPLE STREAM OCCUPIES  3 GRID POINTS

GRID PARAMETERS
RECTANGULAR COORDINATES
```

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
NUMBER OF SPACE POINTS=33

INDEX   POSITION          VOLUME          AREA
    1    0.0         0.312500-01    0.100000 01
    2    0.06250     0.625000-01    0.100000 01
    3    0.12500     0.625000-01    0.100000 01
    4    0.18750     0.625000-01    0.100000 01
    5    0.25000     0.625000-01    0.100000 01
    6    0.31250     0.625000-01    0.100000 01
    7    0.37500     0.625000-01    0.100000 01
    8    0.43750     0.625000-01    0.100000 01
    9    0.50000     0.625000-01    0.100000 01
   10    0.56250     0.625000-01    0.100000 01
   11    0.62500     0.625000-01    0.100000 01
   12    0.68750     0.625000-01    0.100000 01
   13    0.75000     0.625000-01    0.100000 01
   14    0.81250     0.625000-01    0.100000 01
   15    0.87500     0.625000-01    0.100000 01
   16    0.93750     0.625000-01    0.100000 01
   17    1.00000     0.625000-01    0.100000 01
   18    1.06250     0.625000-01    0.100000 01
   19    1.12500     0.625000-01    0.100000 01
   20    1.18750     0.625000-01    0.100000 01
   21    1.25000     0.625000-01    0.100000 01
   22    1.31250     0.625000-01    0.100000 01
   23    1.37500     0.625000-01    0.100000 01
   24    1.43750     0.625000-01    0.100000 01
   25    1.50000     0.625000-01    0.100000 01
   26    1.56250     0.625000-01    0.100000 01
   27    1.62500     0.625000-01    0.100000 01
   28    1.68750     0.625000-01    0.100000 01
   29    1.75000     0.625000-01    0.100000 01
   30    1.81250     0.625000-01    0.100000 01
   31    1.87500     0.625000-01    0.100000 01
   32    1.93750     0.625000-01    0.100000 01
   33    2.00000     0.312500-01

AEROSOL/DROPLET PARAMETERS
AEROSOL DISTRIBUTION IS C*S TO K
  DISTRIBUTION PARAMETERS ARE
     C=  62503.00
     K=1.000
     SMIN= 0.200 PERCENT
     SMAX= 1.000 PERCENT
     TOTAL PARTICLE CONC=     503.03 PER CC

ACCOMMODATION COEFF              1.000
CONDENSATION COEFF               0.030
```

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

NUMBER OF DROPLET CLASSES= 20

CLASS	NO/CC	CRIT SSAT	CRIT RADIUS	INIT RADIUS	A	B
1	25.00	0.00240	0.29857	0.06187	1.074870-07	3.194020-17
2	25.00	0.00280	0.25592	0.05555	1.074870-07	2.346620-17
3	25.00	0.00320	0.22393	0.05059	1.074670-07	1.796630-17
4	25.00	0.00360	0.19905	0.04656	1.074870-07	1.419560-17
5	25.00	0.00400	0.17914	0.04322	1.074870-07	1.149850-17
6	25.00	0.00440	0.16236	0.04040	1.074870-07	9.502860-18
7	25.00	0.00480	0.14929	0.03797	1.074870-07	7.985040-18
8	25.00	0.00520	0.13780	0.03586	1.074870-07	6.803820-18
9	25.00	0.00560	0.12796	0.03401	1.074870-07	5.866560-18
10	25.00	0.00600	0.11943	0.03237	1.074870-07	5.110420-18
11	25.00	0.00640	0.11197	0.03090	1.074870-07	4.491580-18
12	25.00	0.00680	0.10538	0.02957	1.074870-07	3.978700-18
13	25.00	0.00720	0.09952	0.02837	1.074870-07	3.548910-18
14	25.00	0.00760	0.09429	0.02728	1.074870-07	3.185170-18
15	25.00	0.00800	0.08957	0.02628	1.074870-07	2.874610-18
16	25.00	0.00840	0.08531	0.02536	1.074870-07	2.607360-18
17	25.00	0.00880	0.08143	0.02451	1.074870-07	2.375710-18
18	25.00	0.00920	0.07789	0.02372	1.074870-07	2.173620-18
19	25.00	0.00960	0.07464	0.02299	1.074870-07	1.996260-18
20	25.00	0.01000	0.07166	0.02231	1.074870-07	1.839750-18

TOTAL SAMPLE GAS FLOW 2.462 CC/SEC
TOTAL PARTICLE FLUX 1231.079 NO/SEC

OUTPUT AT X=15.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.135	21.863	16.76025	0.0	0.07847	0.0	0.0
3	0.257	21.730	16.63238	0.0	0.15053	0.0	0.0
4	0.373	21.596	16.50422	0.0	0.21803	0.0	0.0
5	0.480	21.461	16.37574	0.0	0.28090	0.0	0.0
6	0.579	21.326	16.24691	0.0	0.33903	0.0	0.0
7	0.669	21.191	16.11770	0.0	0.39234	0.0	0.0
8	0.750	21.055	15.98808	0.0	0.44074	0.0	0.0
9	0.823	20.919	15.85800	0.0	0.48415	0.0	0.0
10	0.887	20.782	15.72741	0.0	0.52247	0.0	0.0
11	0.943	20.644	15.59626	0.0	0.55558	0.0	0.0
12	0.990	20.505	15.46447	0.0	0.58337	0.0	0.0
13	1.029	20.366	15.33193	0.0	0.60570	0.0	0.0
14	1.059	20.225	15.19855	0.0	0.62238	0.0	0.0
15	1.080	20.084	15.06417	0.0	0.63321	0.0	0.0
16	1.093	20.000	13.10140	0.0000001	-11.75202	0.0	0.0
17	1.097	20.000	13.10140	0.0000001	-11.75202	0.0	0.0
18	1.093	20.000	13.10140	0.0000001	-11.75202	0.0	0.0
19	1.080	19.935	14.92373	0.0	0.63800	0.0	0.0
20	1.059	19.794	14.78945	0.0	0.63620	0.0	0.0
21	1.029	19.653	14.65625	0.0	0.62837	0.0	0.0

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
22	0.990	19.513	14.52379	0.0	0.61359	0.0	0.0
23	0.943	19.373	14.39253	0.0	0.59270	0.0	0.0
24	0.887	19.235	14.26177	0.0	0.56529	0.0	0.0
25	0.825	19.097	14.13162	0.0	0.53125	0.0	0.0
26	0.756	18.959	14.00179	0.0	0.49045	0.0	0.0
27	0.669	18.822	13.87282	0.0	0.41274	0.0	0.0
28	0.579	18.685	13.74434	0.0	0.33776	0.0	0.0
29	0.480	18.548	13.61562	0.0	0.25526	0.0	0.0
30	0.372	18.411	13.48749	0.0	0.25526	0.0	0.0
31	0.257	18.275	13.35963	0.0	0.17951	0.0	0.0
32	0.133	18.139	13.23201	0.0	0.09271	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 0.0 PER SEC

OUTPUT AT X=18.00 CM
MEDIAN PLANE SUPERSATURATION= 0.2406 PERCENT
MEDIAN PLANE FLOW VELOCITY= 1.098 CM/SEC
TOTAL FLUX OF ACTIVATED DROPS= 0.0 PER SEC
DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4
16	475.	25.
17	500.	0.
18	500.	0.

OUTPUT AT X=21.00 CM
MEDIAN PLANE SUPERSATURATION= 0.6095 PERCENT
MEDIAN PLANE FLOW VELOCITY= 1.098 CM/SEC
TOTAL FLUX OF ACTIVATED DROPS= 533.494 PER SEC
DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8
16	325.	75.	75.	25.
17	325.	75.	75.	25.
18	325.	75.	75.	25.

OUTPUT AT X=24.00 CM
MEDIAN PLANE SUPERSATURATION= 0.6643 PERCENT
MEDIAN PLANE FLOW VELOCITY= 1.098 CM/SEC
TOTAL FLUX OF ACTIVATED DROPS= 677.094 PER SEC
DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5
16	250.	25.	25.	25.	50.	0.
17	250.	25.	25.	25.	50.	124.
18	250.	25.	25.	25.	50.	125.
19	0.	0.	0.	0.	0.	126.

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
OUTPUT AT X=27.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.0674 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS= 677.094 PER SEC
          DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
     INDEX   0.2   0.4   0.6   0.8   1.0   1.5   2.0
       16  225.   25.    0.    0.    0.    0.    0.
       17  225.    0.   25.    0.   25.   50.   50.
       18  225.    0.   25.    0.    0.   75.  175.
       19    0.    0.    0.    0.    0.   76.  178.
       20    0.    0.    0.    0.    0.    0.  129.

OUTPUT AT X=30.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.0653 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.093 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS= 677.094 PER SEC
          DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
     INDEX   0.2   0.4   0.6   0.8   1.0   1.5   2.0   2.5
       16  225.    0.    0.    0.    0.    0.    0.    0.
       17  225.    0.    0.    0.    0.   25.    0.    0.
       18  225.    0.    0.    0.    0.   25.   50.    0.
       19    0.    0.    0.    0.    0.   26.   51.   51.
       20    0.    0.    0.    0.    0.    0.   52.  129.
       21    0.    0.    0.    0.    0.    0.    0.  213.
       22    0.    0.    0.    0.    0.    0.    0.  166.
       23    0.    0.    0.    0.    0.    0.    0.   58.
       24    0.    0.    0.    0.    0.    0.    0.   31.

OUTPUT AT X=33.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.0613 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS= 677.094 PER SEC
          DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
     INDEX   0.2   0.4   0.6   0.8   1.0   1.5   2.0   2.5   3.0
       16  225.    0.    0.    0.    0.    0.    0.    0.    0.
       17  225.    0.    0.    0.    0.    0.    0.    0.    0.
       18  225.    0.    0.    0.    0.    0.   25.    0.    0.
       19    0.    0.    0.    0.    0.    0.   25.    0.    0.
       20    0.    0.    0.    0.    0.    0.   26.   26.    0.
       21    0.    0.    0.    0.    0.    0.    0.   53.    0.
       22    0.    0.    0.    0.    0.    0.    0.   55.   55.
       23    0.    0.    0.    0.    0.    0.    0.   29.   58.
       24    0.    0.    0.    0.    0.    0.    0.    0.  154.
       25    0.    0.    0.    0.    0.    0.    0.    0.  100.
       26    0.    0.    0.    0.    0.    0.    0.    0.  182.
       27    0.    0.    0.    0.    0.    0.    0.    0.  123.
       28    0.    0.    0.    0.    0.    0.    0.    0.   95.
       29    0.    0.    0.    0.    0.    0.    0.    0.   57.
       30    0.    0.    0.    0.    0.    0.    0.    0.   73.
```

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

OUTPUT AT X=36.00 CM
MEDIAN PLANE SUPERSATURATION= 0.6666 PERCENT
MEDIAN PLANE FLOW VELOCITY= 1.098 CM/SEC
TOTAL FLUX OF ACTIVATED DROPS= 266.707 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5
16	225.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17	225.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	225.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	0.	0.	0.	0.	0.	0.	0.	26.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	0.	0.	0.	0.	0.	0.	0.	28.	0.	0.
23	0.	0.	0.	0.	0.	0.	0.	29.	29.	0.
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	0.	0.	0.	0.	0.	0.	0.	0.	67.	0.
26	0.	0.	0.	0.	0.	0.	0.	0.	36.	0.
27	0.	0.	0.	0.	0.	0.	0.	0.	82.	0.
28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29	0.	0.	0.	0.	0.	0.	0.	0.	57.	114.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	106.

OUTPUT AT X=37.00 CM
MEDIAN PLANE SUPERSATURATION= 0.6736 PERCENT
MEDIAN PLANE FLOW VELOCITY= 1.078 CM/SEC
TOTAL FLUX OF ACTIVATED DROPS= 82.045 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5
16	175.	0.	0.	0.	0.	0.	0.	0.	0.	0.
17	225.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	225.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19	51.	0.	0.	0.	0.	0.	0.	0.	0.	0.
20	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
22	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
23	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
24	0.	0.	0.	0.	0.	0.	0.	0.	31.	0.
25	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
26	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	0.	0.	0.	0.	0.	0.	0.	0.	41.	0.
28	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
29	0.	0.	0.	0.	0.	0.	0.	0.	57.	0.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
32	0.	0.	0.	0.	0.	0.	0.	0.	0.	206.

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
OUTPUT AT X=42.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6768 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
                NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X=45.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6778 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
                NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X=48.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
                NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X=51.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
                NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X = 54.00CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
                NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.
```

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
OUTPUT AT X=57.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X=60.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X=63.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.

OUTPUT AT X=66.00 CM
  MEDIAN PLANE SUPERSATURATION=  0.6780 PERCENT
  MEDIAN PLANE FLOW VELOCITY=  1.098 CM/SEC
  TOTAL FLUX OF ACTIVATED DROPS=    0.0    PER SEC
            DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
              NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN
        INDEX    0.2
           17   224.
           18   226.
           19   228.
  * END SIMULATION *
```

Figure 3-45. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 1 (Cont.)

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
     CFD
   1.          .03
 N VS SC
         6
  25.          .002
 100.          .004
 125.          .006
 125.          .008
 100.          .009
  25.          .01
TEST 3
  66.         2.        36.        12.
   3.         6.        15.
 293.15   1000.       293.15     291.15
        30 291.15    1000.       50.
         3 293.15     291.15
     .0625     3.
          0
         11
STOP SIM
```

Figure 3-46. Input Card Images of Phoretic Continuous Flow Diffusion Experiment - Example 2

INPUT PARAMETERS FOR CFD EXPERIMENT TEST 3

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=30

INDEX	POSITION	VOLUME	AREA
1	0.0	0.34483D-01	0.10000D 01
2	0.06897	0.68966D-01	0.10000D 01
3	0.13793	0.68966D-01	0.10000D 01
4	0.20690	0.68966D-01	0.10000D 01
5	0.27586	0.68966D-01	0.10000D 01
6	0.34483	0.68966D-01	0.10000D 01
7	0.41379	0.68966D-01	0.10000D 01
8	0.48276	0.68966D-01	0.10000D 01
9	0.55172	0.68966D-01	0.10000D 01
10	0.62069	0.68966D-01	0.10000D 01
11	0.68966	0.68966D-01	0.10000D 01
12	0.75862	0.68966D-01	0.10000D 01
13	0.82759	0.68966D-01	0.10000D 01
14	0.89655	0.68966D-01	0.10000D 01
15	0.96552	0.68966D-01	0.10000D 01
16	1.03448	0.68966D-01	0.10000D 01
17	1.10345	0.68966D-01	0.10000D 01
18	1.17241	0.68966D-01	0.10000D 01
19	1.24138	0.68966D-01	0.10000D 01
20	1.31034	0.68966D-01	0.10000D 01
21	1.37931	0.68966D-01	0.10000D 01
22	1.44828	0.68966D-01	0.10000D 01
23	1.51724	0.68966D-01	0.10000D 01
24	1.58621	0.68966D-01	0.10000D 01
25	1.65517	0.68966D-01	0.10000D 01
26	1.72414	0.68966D-01	0.10000D 01
27	1.79310	0.68966D-01	0.10000D 01
28	1.86207	0.68966D-01	0.10000D 01
29	1.93103	0.68966D-01	0.10000D 01
30	2.00000	0.34483D-01	

THIS IS A 0-3 EXPERIMENT

CFD CHAMBER LENGTH	66.000 CM
CFD CHAMBER WIDTH	36.000 CM
PLATE SPACING	2.000 CM
INJECTION SLIT LENGTH	12.000 CM
START OF WET-DRY ZONE	3.000 CM
START OF WET-WET ZONE	6.000 CM
TOP PLATE TEMPERATURE	295.150 DEG K
BOTTOM PLATE TEMPERATURE	291.150 DEG K
SATURATOR TEMPERATURE	291.150 DEG K
SATURATOR PRESSURE	1000.000 MB
CARRIER GAS FLOW RATE	50.000 CC/SEC
INITIAL GAS TEMPERATURE	293.150 DEG K
CHAMBER PRESSURE	1000.000 MB
INITIAL SUPERSATURATION	-11.752 PERCENT

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2

HORIZONTAL INCREMENT 0.063 CM
OUTPUT SPACE INCREMENT 3.000 CM
SAMPL INJECTION POINT 15.000 CM

OUTPUT AT X= 3.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	SUPERSAT PERCENT
1	0.0	22.000	13.10140	-21.97286
2	0.139	21.863	13.10140	-21.31572
3	0.268	21.726	13.10140	-20.65207
4	0.387	21.588	13.10140	-19.98183
5	0.496	21.451	13.10140	-19.30497
6	0.595	21.313	13.10140	-18.62141
7	0.685	21.176	13.10140	-17.93112
8	0.764	21.038	13.10140	-17.23405
9	0.833	20.901	13.10140	-16.53014
10	0.893	20.763	13.10140	-15.81933
11	0.942	20.625	13.10140	-15.10157
12	0.982	20.488	13.10140	-14.37676
13	1.012	20.350	13.10140	-13.64483
14	1.032	20.212	13.10140	-12.90566
15	1.042	20.075	13.10140	-12.15915
16	1.042	19.937	13.10140	-11.40516
17	1.032	19.799	13.10140	-10.64357
18	1.012	19.661	13.10140	-9.87425
19	0.982	19.523	13.10140	-9.09707
20	0.942	19.385	13.10140	-8.31190
21	0.893	19.247	13.10140	-7.51864
22	0.833	19.109	13.10140	-6.71717
23	0.764	18.970	13.10140	-5.90741
24	0.685	18.832	13.10140	-5.08926
25	0.595	18.693	13.10140	-4.26265
26	0.496	18.555	13.10140	-3.42751
27	0.387	18.416	13.10140	-2.58375
28	0.268	18.278	13.10140	-1.73130
29	0.139	18.139	13.10140	-0.87008
30	0.0	18.000	13.10140	0.00000

OUTPUT AT X= 6.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	SUPERSAT PERCENT
1	0.0	22.000	16.89101	0.00000
2	0.139	21.863	15.95708	-4.59315
3	0.268	21.727	15.14747	-8.56066
4	0.387	21.589	14.50591	-11.60623
5	0.496	21.452	14.03143	-13.71065
6	0.595	21.315	13.69867	-14.99930
7	0.685	21.177	13.47508	-15.64781
8	0.764	21.040	13.33007	-15.82751
9	0.834	20.902	13.23875	-15.68086
10	0.893	20.764	13.18263	-15.31546

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

11	0.943	20.627	13.14885	-14.80728
12	0.982	20.489	13.12885	-14.20737
13	1.012	20.351	13.11717	-13.54868
14	1.032	20.213	13.11042	-12.85184
15	1.042	20.075	13.10665	-12.12941
16	1.042	19.937	13.10434	-11.38890
17	1.032	19.799	13.10309	-10.63467
18	1.012	19.661	13.10237	-9.86924
19	0.982	19.523	13.10197	-9.09403
20	0.943	19.385	13.10173	-8.30979
21	0.893	19.247	13.10160	-7.51693
22	0.834	19.109	13.10152	-6.71563
23	0.764	18.970	13.10147	-5.90596
24	0.685	18.832	13.10145	-5.08790
25	0.595	18.693	13.10143	-4.26143
26	0.496	18.555	13.10142	-3.42647
27	0.387	18.416	13.10141	-2.58294
28	0.268	18.278	13.10141	-1.73074
29	0.139	18.139	13.10140	-0.86980
30	0.0	18.000	13.10140	0.00000

OUTPUT AT X= 9.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT G/KG	SUPERSAT PERCENT
1	0.0	22.000	16.89101	0.00000
2	0.139	21.863	16.73025	-0.09607
3	0.269	21.727	16.56950	-0.19969
4	0.388	21.590	16.40892	-0.31009
5	0.497	21.453	16.24875	-0.42596
6	0.597	21.316	16.08932	-0.54546
7	0.686	21.179	15.93100	-0.66636
8	0.766	21.041	15.77420	-0.78606
9	0.836	20.904	15.61937	-0.90175
10	0.895	20.767	15.46696	-1.01048
11	0.945	20.629	15.31739	-1.10931
12	0.985	20.492	15.17106	-1.19543
13	1.015	20.354	15.02830	-1.26626
14	1.034	20.216	14.88939	-1.31961
15	1.044	20.078	14.75452	-1.35372
16	1.044	19.940	14.62378	-1.36739
17	1.034	19.802	14.49718	-1.36001
18	1.015	19.664	14.37462	-1.33159
19	0.985	19.526	14.25592	-1.28277
20	0.945	19.388	14.14082	-1.21479
21	0.895	19.249	14.02898	-1.12941
22	0.836	19.111	13.92002	-1.02887
23	0.766	18.972	13.81349	-0.91573
24	0.686	18.834	13.70896	-0.79280
25	0.597	18.695	13.60598	-0.66296
26	0.497	18.556	13.50414	-0.52906
27	0.388	18.417	13.40304	-0.39374
28	0.269	18.278	13.30237	-0.25933
29	0.139	18.139	13.20187	-0.12766
30	0.0	18.000	13.10140	0.00000

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

OUTPUT AT X=12.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT G/KG	SUPERSAT PERCENT
1	0.0	22.000	16.89101	0.00000
2	0.139	21.863	16.75650	0.05668
3	0.269	21.727	16.62197	0.10821
4	0.388	21.590	16.48742	0.15460
5	0.497	21.453	16.35290	0.19594
6	0.597	21.316	16.21846	0.23240
7	0.687	21.179	16.08413	0.26420
8	0.766	21.041	15.94999	0.29160
9	0.836	20.904	15.81610	0.31491
10	0.895	20.767	15.68252	0.33443
11	0.945	20.629	15.54931	0.35049
12	0.985	20.492	15.41653	0.36337
13	1.015	20.354	15.28423	0.37334
14	1.035	20.216	15.15244	0.38060
15	1.045	20.078	15.02120	0.38528
16	1.045	19.941	14.89051	0.38745
17	1.035	19.803	14.76038	0.38707
18	1.015	19.664	14.63079	0.38402
19	0.985	19.526	14.50172	0.37810
20	0.945	19.388	14.37314	0.36899
21	0.895	19.250	14.24499	0.35633
22	0.836	19.111	14.11721	0.33967
23	0.766	18.973	13.98975	0.31851
24	0.687	18.834	13.86255	0.29231
25	0.597	18.695	13.73553	0.26053
26	0.497	18.556	13.60864	0.22261
27	0.388	18.417	13.48182	0.17804
28	0.269	18.278	13.35503	0.12635
29	0.139	18.139	13.22823	0.06711
30	0.0	18.000	13.10140	0.00000

OUTPUT AT X=15.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT G/KG	SUPERSAT PERCENT
1	0.0	22.000	16.89101	0.00000
2	0.139	21.863	16.76025	0.07847
3	0.269	21.727	16.62946	0.15212
4	0.388	21.590	16.49863	0.22087
5	0.498	21.453	16.36777	0.28464
6	0.397	21.316	16.23688	0.34334
7	0.687	21.179	16.10599	0.39692
8	0.766	21.042	15.97508	0.44531
9	0.836	20.904	15.84418	0.48845
10	0.896	20.767	15.71329	0.52628
11	0.945	20.629	15.58242	0.55874
12	0.985	20.492	15.45158	0.58577
13	1.015	20.354	15.32078	0.60730

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

14	1.035	20.216	15.19001	0.62323
15	1.045	20.079	15.05929	0.63348
16	1.045	19.941	14.92861	0.63794
17	1.035	19.803	14.79798	0.63649
18	1.015	19.664	14.66740	0.62898
19	0.985	19.526	14.53685	0.61527
20	0.945	19.388	14.40634	0.59519
21	0.896	19.250	14.27586	0.56855
22	0.836	19.111	14.14540	0.53517
23	0.766	18.973	14.01495	0.49484
24	0.687	18.834	13.88450	0.44734
25	0.597	18.695	13.75405	0.39248
26	0.498	18.556	13.62358	0.33002
27	0.388	18.417	13.49308	0.25975
28	0.269	18.278	13.36256	0.18146
29	0.139	18.139	13.23200	0.09494
30	0.0	18.000	13.10140	0.00000

AEROSOL SAMPLE INJECTED AT X=15.00

SAMPLE GAS TEMPERATURE= 20.000 DEG C
SAMPLE GAS DEW POINT T= 18.000 DEG C
SAMPLE STREAM OCCUPIES 3 GRID POINTS

GRID PARAMETERS
RECTANGULAR COORDINATES

NUMBER OF SPACE POINTS=33

INDEX	POSITION	VOLUME	AREA
1	0.0	0.31250D-01	0.100000 01
2	0.06250	0.62500D-01	0.100000 01
3	0.12500	0.62500D-01	0.100000 01
4	0.18750	0.62500D-01	0.100000 01
5	0.25000	0.62500D-01	0.100000 01
6	0.31250	0.62500D-01	0.100000 01
7	0.37500	0.62500D-01	0.100000 01
8	0.43750	0.62500D-01	0.100000 01
9	0.50000	0.62500D-01	0.100000 01
10	0.56250	0.62500D-01	0.100000 01
11	0.62500	0.62500D-01	0.100000 01
12	0.68750	0.62500D-01	0.100000 01
13	0.75000	0.62500D-01	0.100000 01
14	0.81250	0.62500D-01	0.100000 01
15	0.87500	0.62500D-01	0.100000 01
16	0.93750	0.62500D-01	0.100000 01
17	1.00000	0.62500D-01	0.100000 01
18	1.06250	0.62500D-01	0.100000 01
19	1.12500	0.62500D-01	0.100000 01
20	1.18750	0.62500D-01	0.100000 01
21	1.25000	0.62500D-01	0.100000 01
22	1.31250	0.62500D-01	0.100000 01

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

23	1.37500	0.62500D-01	0.10000D 01
24	1.43750	0.62500D-01	0.10000D 01
25	1.50000	0.62500D-01	0.10000D 01
26	1.56250	0.62500D-01	0.10000D 01
27	1.62500	0.62500D-01	0.10000D 01
28	1.68750	0.62500D-01	0.10000D 01
29	1.75000	0.62500D-01	0.10000D 01
30	1.81250	0.62500D-01	0.10000D 01
31	1.87500	0.62500D-01	0.10000D 01
32	1.93750	0.62500D-01	0.10000D 01
33	2.00000	0.31250D-01	

AEROSOL/DROPLET PARAMETERS
AEROSOL DISTRIBUTION IS N VS SC

ACCOMMODATION COEFF 1.000
CONDENSATION COEFF 0.030

NUMBER OF DROPLET CLASSES= 6

CLASS	NO/CC	CRIT SSAT	CRIT RADIUS	INIT RADIUS	A	B
1	25.00	0.00200	0.35829	0.07022	1.07487D-07	4.59938D-17
2	100.00	0.00400	0.17914	0.04322	1.07487D-07	1.14985D-17
3	125.00	0.00600	0.11943	0.03237	1.07487D-07	5.11042D-18
4	125.00	0.00800	0.08957	0.02628	1.07487D-07	2.87461D-18
5	100.00	0.00900	0.07962	0.02411	1.07487D-07	2.27130D-18
6	25.00	0.01000	0.07166	0.02231	1.07487D-07	1.83975D-18

TOTAL SAMPLE GAS FLOW 2.462 CC/SEC
TOTAL PARTICLE FLUX 1231.079 NO/SEC

OUTPUT AT X=15.06 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.863	16.76025	0.0	0.07847	0.0	0.0
3	0.257	21.730	16.63238	0.0	0.15053	0.0	0.0
4	0.373	21.596	16.50422	0.0	0.21803	0.0	0.0
5	0.480	21.461	16.37574	0.0	0.28090	0.0	0.0
6	0.579	21.326	16.24691	0.0	0.33903	0.0	0.0
7	0.669	21.191	16.11770	0.0	0.39234	0.0	0.0
8	0.750	21.055	15.98808	0.0	0.44074	0.0	0.0
9	0.823	20.919	15.85800	0.0	0.48415	0.0	0.0
10	0.887	20.782	15.72741	0.0	0.52247	0.0	0.0
11	0.943	20.644	15.59626	0.0	0.55558	0.0	0.0
12	0.990	20.505	15.46447	0.0	0.58337	0.0	0.0
13	1.029	20.366	15.33193	0.0	0.60570	0.0	0.0
14	1.059	20.225	15.19855	0.0	0.62238	0.0	0.0
15	1.080	20.084	15.06417	0.0	0.63321	0.0	0.0
16	1.093	20.000	13.10140	0.0000001	-11.75202	0.0	0.0
17	1.097	20.000	13.10140	0.0000001	-11.75202	0.0	0.0
18	1.093	20.000	13.10140	0.0000001	-11.75202	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

19	1.080	19.935	14.92373	0.0	0.63800	0.0	0.0
20	1.059	19.794	14.78965	0.0	0.63620	0.0	0.0
21	1.029	19.653	14.65625	0.0	0.62807	0.0	0.0
22	0.990	19.513	14.52399	0.0	0.61359	0.0	0.0
23	0.943	19.373	14.39253	0.0	0.59270	0.0	0.0
24	0.887	19.235	14.26177	0.0	0.56529	0.0	0.0
25	0.823	19.097	14.13162	0.0	0.53125	0.0	0.0
26	0.750	18.959	14.00199	0.0	0.49045	0.0	0.0
27	0.669	18.822	13.87282	0.0	0.44274	0.0	0.0
28	0.579	18.685	13.74404	0.0	0.38796	0.0	0.0
29	0.480	18.548	13.61562	0.0	0.32596	0.0	0.0
30	0.373	18.411	13.48749	0.0	0.25656	0.0	0.0
31	0.257	18.275	13.35963	0.0	0.17961	0.0	0.0
32	0.133	18.139	13.23200	0.0	0.09494	0.0	0.0
33	0.0	18.000	13.10140	0.0	0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 0.0 PER SEC

OUTPUT AT X=18.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.76712	0.0	0.04011	0.0	0.0
3	0.257	21.752	16.64320	0.0	0.07583	0.0	0.0
4	0.373	21.628	16.51928	0.0	0.10719	0.0	0.0
5	0.480	21.504	16.39539	0.0	0.13431	0.0	0.0
6	0.579	21.380	16.27159	0.0	0.15740	0.0	0.0
7	0.669	21.256	16.14793	0.0	0.17672	0.0	0.0
8	0.750	21.131	16.02446	0.0	0.19258	0.0	0.0
9	0.823	21.007	15.90127	0.0	0.20534	0.0	0.0
10	0.887	20.883	15.77842	0.0	0.21538	0.0	0.0
11	0.943	20.758	15.65599	0.0	0.22310	0.0	0.0
12	0.990	20.633	15.53403	0.0	0.22890	0.0	0.0
13	1.029	20.509	15.41262	0.0	0.23314	0.0	0.0
14	1.059	20.384	15.29181	0.0	0.23618	0.0	0.0
15	1.080	20.259	15.17165	0.0	0.23830	0.0	0.0
16	1.093	20.134	15.05216	0.0000021	0.23973	0.0	0.0
17	1.098	20.009	14.93337	0.0000021	0.24062	0.0	0.0
18	1.093	19.884	14.81529	0.0000021	0.24105	0.0	0.0
19	1.080	19.759	14.69790	0.0	0.24098	0.0	0.0
20	1.059	19.634	14.58120	0.0	0.24031	0.0	0.0
21	1.029	19.509	14.46515	0.0	0.23883	0.0	0.0
22	0.990	19.384	14.34969	0.0	0.23624	0.0	0.0
23	0.943	19.258	14.23479	0.0	0.23218	0.0	0.0
24	0.887	19.133	14.12037	0.0	0.22619	0.0	0.0
25	0.823	19.007	14.00637	0.0	0.21780	0.0	0.0
26	0.750	18.882	13.89271	0.0	0.20645	0.0	0.0
27	0.669	18.756	13.77933	0.0	0.19160	0.0	0.0
28	0.579	18.630	13.66616	0.0	0.17270	0.0	0.0
29	0.480	18.504	13.55312	0.0	0.14919	0.0	0.0
30	0.373	18.378	13.44017	0.0	0.12058	0.0	0.0
31	0.257	18.252	13.32725	0.0	0.08642	0.0	0.0
32	0.133	18.126	13.21434	0.0	0.04632	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

TOTAL FLUX OF ACTIVATED DROPS= 0.0 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4
16	475.	25.
17	475.	25.
18	475.	25.

OUTPUT AT X=21.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.77215	0.0	0.06920	0.0	0.0
3	0.257	21.752	16.65325	0.0	0.13443	0.0	0.0
4	0.373	21.628	16.53433	0.0	0.19561	0.0	0.0
5	0.480	21.504	16.41539	0.0	0.25271	0.0	0.0
6	0.579	21.380	16.29644	0.0	0.30568	0.0	0.0
7	0.669	21.256	16.17747	0.0	0.35450	0.0	0.0
8	0.750	21.132	16.05852	0.0	0.39913	0.0	0.0
9	0.823	21.007	15.93958	0.0	0.43956	0.0	0.0
10	0.888	20.883	15.82067	0.0	0.47578	0.0	0.0
11	0.943	20.758	15.70179	0.0	0.50777	0.0	0.0
12	0.990	20.634	15.58296	0.0	0.53552	0.0	0.0
13	1.029	20.509	15.46419	0.0	0.55899	0.0	0.0
14	1.059	20.384	15.34549	0.0	0.57818	0.0	0.0
15	1.080	20.259	15.22686	0.0	0.59303	0.0	0.0
16	1.093	20.135	15.10831	0.0000500	0.60351	124.948	102.456
17	1.098	20.010	14.98984	0.0000509	0.60956	124.948	102.858
18	1.093	19.885	14.87146	0.0000510	0.61112	124.948	102.456
19	1.080	19.759	14.75315	0.0	0.60810	0.0	0.0
20	1.059	19.634	14.63493	0.0	0.60035	0.0	0.0
21	1.029	19.509	14.51678	0.0	0.58778	0.0	0.0
22	0.990	19.384	14.39870	0.0	0.57022	0.0	0.0
23	0.943	19.258	14.28068	0.0	0.54754	0.0	0.0
24	0.888	19.133	14.16271	0.0	0.51957	0.0	0.0
25	0.823	19.007	14.04477	0.0	0.48614	0.0	0.0
26	0.750	18.882	13.92686	0.0	0.44706	0.0	0.0
27	0.669	18.756	13.80897	0.0	0.40215	0.0	0.0
28	0.579	18.630	13.69108	0.0	0.35123	0.0	0.0
29	0.480	18.504	13.57319	0.0	0.29410	0.0	0.0
30	0.373	18.378	13.45528	0.0	0.23058	0.0	0.0
31	0.257	18.252	13.33735	0.0	0.16050	0.0	0.0
32	0.133	18.126	13.21939	0.0	0.08369	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 307.770 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8
16	375.	100.	0.	25.
17	375.	100.	0.	25.
18	375.	100.	0.	25.

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

OUTPUT AT X=24.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.77293	0.0	0.07366	0.0	0.0
3	0.257	21.752	16.65481	0.0	0.14340	0.0	0.0
4	0.373	21.628	16.53667	0.0	0.20915	0.0	0.0
5	0.480	21.504	16.41849	0.0	0.27084	0.0	0.0
6	0.579	21.380	16.30029	0.0	0.32838	0.0	0.0
7	0.669	21.256	16.18206	0.0	0.38170	0.0	0.0
8	0.750	21.132	16.06380	0.0	0.43072	0.0	0.0
9	0.823	21.007	15.94552	0.0	0.47536	0.0	0.0
10	0.888	20.883	15.82722	0.0	0.51554	0.0	0.0
11	0.943	20.758	15.70889	0.0	0.55119	0.0	0.0
12	0.990	20.634	15.59055	0.0	0.58222	0.0	0.0
13	1.029	20.509	15.47218	0.0	0.60854	0.0	0.0
14	1.059	20.384	15.35380	0.0	0.63007	0.0	0.0
15	1.080	20.260	15.23541	0.0	0.64673	0.0	0.0
16	1.093	20.135	15.11699	0.0006581	0.65841	249.894	204.912
17	1.098	20.010	14.99857	0.0006728	0.66518	249.894	205.716
18	1.093	19.885	14.88015	0.0006755	0.66696	249.894	204.912
19	1.080	19.760	14.76171	0.0	0.66364	0.0	0.0
20	1.059	19.634	14.64326	0.0	0.65496	0.0	0.0
21	1.029	19.509	14.52479	0.0	0.64080	0.0	0.0
22	0.990	19.384	14.40631	0.0	0.62105	0.0	0.0
23	0.943	19.258	14.28781	0.0	0.59559	0.0	0.0
24	0.888	19.133	14.16928	0.0	0.56432	0.0	0.0
25	0.823	19.007	14.05074	0.0	0.52710	0.0	0.0
26	0.750	18.882	13.93217	0.0	0.48381	0.0	0.0
27	0.669	18.756	13.81357	0.0	0.43433	0.0	0.0
28	0.579	18.630	13.69495	0.0	0.37852	0.0	0.0
29	0.480	18.504	13.57630	0.0	0.31626	0.0	0.0
30	0.373	18.378	13.45763	0.0	0.24741	0.0	0.0
31	0.257	18.252	13.33891	0.0	0.17184	0.0	0.0
32	0.133	18.126	13.22017	0.0	0.08941	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5
16	250.	125.	0.	0.	0.	125.
17	250.	125.	0.	0.	0.	125.
18	250.	125.	0.	0.	0.	125.

OUTPUT AT X=27.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.77304	0.0	0.07408	0.0	0.0
3	0.257	21.752	16.65503	0.0	0.14425	0.0	0.0
4	0.373	21.628	16.53699	0.0	0.21043	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

5	0.480	21.504	16.41893	0.0	0.27255	0.0	0.0
6	0.579	21.380	16.30083	0.0	0.33052	0.0	0.0
7	0.669	21.256	16.18270	0.0	0.38425	0.0	0.0
8	0.750	21.132	16.06454	0.0	0.43365	0.0	0.0
9	0.823	21.008	15.94634	0.0	0.47864	0.0	0.0
10	0.888	20.883	15.82812	0.0	0.51912	0.0	0.0
11	0.943	20.759	15.70987	0.0	0.55501	0.0	0.0
12	0.990	20.634	15.59158	0.0	0.58621	0.0	0.0
13	1.029	20.510	15.47327	0.0	0.61262	0.0	0.0
14	1.059	20.385	15.35492	0.0	0.63415	0.0	0.0
15	1.080	20.260	15.23655	0.0	0.65069	0.0	0.0
16	1.093	20.135	15.11814	0.0028884	0.66215	249.893	204.912
17	1.098	20.010	14.99972	0.0029840	0.66888	249.893	205.716
18	1.093	19.885	14.88129	0.0030029	0.67081	249.893	204.912
19	1.080	19.760	14.76285	0.0	0.66783	0.0	0.0
20	1.059	19.635	14.64438	0.0	0.65937	0.0	0.0
21	1.029	19.510	14.52588	0.0	0.64532	0.0	0.0
22	0.990	19.384	14.40735	0.0	0.62557	0.0	0.0
23	0.943	19.259	14.28879	0.0	0.60002	0.0	0.0
24	0.888	19.133	14.17019	0.0	0.56855	0.0	0.0
25	0.823	19.008	14.05157	0.0	0.53106	0.0	0.0
26	0.750	18.882	13.93291	0.0	0.48743	0.0	0.0
27	0.669	18.756	13.81422	0.0	0.43754	0.0	0.0
28	0.579	18.630	13.69550	0.0	0.38127	0.0	0.0
29	0.480	18.504	13.57674	0.0	0.31851	0.0	0.0
30	0.373	18.378	13.45795	0.0	0.24913	0.0	0.0
31	0.257	18.252	13.33913	0.0	0.17300	0.0	0.0
32	0.133	18.126	13.22028	0.0	0.09000	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

	NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN							
INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5
16	250.	0.	0.	0.	125.	0.	100.	25.
17	250.	0.	0.	0.	0.	125.	100.	25.
18	250.	0.	0.	0.	0.	125.	100.	25.

OUTPUT AT X=30.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.77303	0.0	0.07373	0.0	0.0
3	0.257	21.753	16.65503	0.0	0.14356	0.0	0.0
4	0.373	21.629	16.53699	0.0	0.20940	0.0	0.0
5	0.480	21.505	16.41892	0.0	0.27117	0.0	0.0
6	0.579	21.381	16.30082	0.0	0.32878	0.0	0.0
7	0.669	21.256	16.18269	0.0	0.38215	0.0	0.0
8	0.750	21.132	16.06452	0.0	0.43119	0.0	0.0
9	0.823	21.008	15.94632	0.0	0.47580	0.0	0.0
10	0.888	20.884	15.82809	0.0	0.51589	0.0	0.0
11	0.943	20.759	15.70983	0.0	0.55138	0.0	0.0
12	0.990	20.635	15.59154	0.0	0.58215	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

13	1.029	20.510	15.47321	0.0	0.60812	0.0	0.0
14	1.059	20.386	15.35486	0.0	0.62919	0.0	0.0
15	1.080	20.261	15.23646	0.0	0.64525	0.0	0.0
16	1.093	20.136	15.11804	0.0075820	0.65620	249.892	204.912
17	1.098	20.011	14.99961	0.0077951	0.66275	249.892	205.716
18	1.093	19.886	14.88119	0.0078428	0.66483	249.892	204.912
19	1.080	19.761	14.76277	0.0	0.66235	0.0	0.0
20	1.059	19.636	14.64432	0.0	0.65436	0.0	0.0
21	1.029	19.510	14.52583	0.0	0.64076	0.0	0.0
22	0.990	19.385	14.40731	0.0	0.62145	0.0	0.0
23	0.943	19.259	14.28876	0.0	0.59631	0.0	0.0
24	0.888	19.134	14.17017	0.0	0.56525	0.0	0.0
25	0.823	19.008	14.05155	0.0	0.52815	0.0	0.0
26	0.750	18.882	13.93289	0.0	0.48490	0.0	0.0
27	0.669	18.757	13.81421	0.0	0.43538	0.0	0.0
28	0.579	18.631	13.69549	0.0	0.37949	0.0	0.0
29	0.480	18.505	13.57674	0.0	0.31708	0.0	0.0
30	0.373	18.379	13.45795	0.0	0.24806	0.0	0.0
31	0.257	18.253	13.33913	0.0	0.17229	0.0	0.0
32	0.133	18.126	13.22028	0.0	0.08965	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0
16	250.	0.	0.	0.	0.	0.	125.	100.	25.
17	250.	0.	0.	0.	0.	0.	125.	100.	25.
18	250.	0.	0.	0.	0.	0.	125.	100.	25.

OUTPUT AT X=33.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.77302	0.0	0.07327	0.0	0.0
3	0.257	21.753	16.65499	0.0	0.14263	0.0	0.0
4	0.373	21.629	16.53693	0.0	0.20800	0.0	0.0
5	0.480	21.505	16.41884	0.0	0.26929	0.0	0.0
6	0.579	21.381	16.30072	0.0	0.32642	0.0	0.0
7	0.669	21.257	16.18257	0.0	0.37931	0.0	0.0
8	0.750	21.133	16.06439	0.0	0.42786	0.0	0.0
9	0.823	21.008	15.94617	0.0	0.47199	0.0	0.0
10	0.888	20.884	15.82793	0.0	0.51159	0.0	0.0
11	0.943	20.760	15.70965	0.0	0.54658	0.0	0.0
12	0.990	20.635	15.59133	0.0	0.57686	0.0	0.0
13	1.029	20.511	15.47299	0.0	0.60232	0.0	0.0
14	1.059	20.386	15.35461	0.0	0.62288	0.0	0.0
15	1.080	20.262	15.23620	0.0	0.63843	0.0	0.0
16	1.093	20.137	15.11775	0.0147702	0.64887	249.892	204.912
17	1.098	20.012	14.99932	0.0151052	0.65523	249.892	205.716
18	1.093	19.887	14.88090	0.0151927	0.65745	249.892	204.912
19	1.080	19.762	14.76250	0.0	0.65544	0.0	0.0
20	1.059	19.636	14.64407	0.0	0.64793	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

21	1.029	19.511	14.52560	0.0	0.63481	0.0	0.0
22	0.990	19.386	14.40710	0.0	0.61598	0.0	0.0
23	0.943	19.260	14.28857	0.0	0.59134	0.0	0.0
24	0.888	19.134	14.17000	0.0	0.56076	0.0	0.0
25	0.823	19.009	14.05140	0.0	0.52415	0.0	0.0
26	0.750	18.883	13.93276	0.0	0.48140	0.0	0.0
27	0.669	18.757	13.81410	0.0	0.43237	0.0	0.0
28	0.579	18.631	13.69540	0.0	0.37697	0.0	0.0
29	0.480	18.505	13.57666	0.0	0.31507	0.0	0.0
30	0.373	18.379	13.45790	0.0	0.24654	0.0	0.0
31	0.257	18.253	13.33910	0.0	0.17128	0.0	0.0
32	0.133	18.126	13.22026	0.0	0.08914	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5
16	250.	0.	0.	0.	0.	0.	0.	125.	125.	0.
17	250.	0.	0.	0.	0.	0.	0.	125.	100.	25.
18	250.	0.	0.	0.	0.	0.	0.	125.	100.	25.

OUTPUT AT X=36.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.876	16.77300	0.0	0.07281	0.0	0.0
3	0.257	21.753	16.65495	0.0	0.14172	0.0	0.0
4	0.373	21.629	16.53687	0.0	0.20663	0.0	0.0
5	0.480	21.505	16.41876	0.0	0.26746	0.0	0.0
6	0.579	21.381	16.30062	0.0	0.32413	0.0	0.0
7	0.669	21.257	16.18245	0.0	0.37655	0.0	0.0
8	0.750	21.133	16.06425	0.0	0.42463	0.0	0.0
9	0.823	21.009	15.94601	0.0	0.46828	0.0	0.0
10	0.888	20.885	15.82775	0.0	0.50741	0.0	0.0
11	0.943	20.760	15.70945	0.0	0.54192	0.0	0.0
12	0.990	20.636	15.59111	0.0	0.57172	0.0	0.0
13	1.029	20.512	15.47275	0.0	0.59671	0.0	0.0
14	1.059	20.387	15.35435	0.0	0.61679	0.0	0.0
15	1.080	20.263	15.23592	0.0	0.63186	0.0	0.0
16	1.093	20.138	15.11746	0.0242595	0.64182	249.892	204.912
17	1.098	20.013	14.99902	0.0247139	0.64801	249.892	205.716
18	1.093	19.888	14.88061	0.0248531	0.65036	249.892	204.912
19	1.080	19.763	14.76223	0.0	0.64879	0.0	0.0
20	1.059	19.637	14.64382	0.0	0.64172	0.0	0.0
21	1.029	19.512	14.52537	0.0	0.62906	0.0	0.0
22	0.990	19.386	14.40689	0.0	0.61069	0.0	0.0
23	0.943	19.260	14.28837	0.0	0.58650	0.0	0.0
24	0.888	19.135	14.16982	0.0	0.55639	0.0	0.0
25	0.823	19.009	14.05124	0.0	0.52026	0.0	0.0
26	0.750	18.883	13.93263	0.0	0.47797	0.0	0.0
27	0.669	18.757	13.81398	0.0	0.42943	0.0	0.0
28	0.579	18.631	13.69530	0.0	0.37451	0.0	0.0
29	0.480	18.505	13.57658	0.0	0.31309	0.0	0.0
30	0.373	18.379	13.45784	0.0	0.24506	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

31	0.257	18.253	13.33906	0.0	0.17028	0.0	0.0
32	0.133	18.126	13.22024	0.0	0.08864	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5
16	250.	0.	0.	0.	0.	0.	0.	0.	125.	125.
17	250.	0.	0.	0.	0.	0.	0.	0.	125.	125.
18	250.	0.	0.	0.	0.	0.	0.	0.	125.	125.

OUTPUT AT X=39.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT L G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77298	0.0	0.07240	0.0	0.0
3	0.257	21.753	16.65491	0.0	0.14088	0.0	0.0
4	0.373	21.629	16.53682	0.0	0.20536	0.0	0.0
5	0.480	21.505	16.41869	0.0	0.26576	0.0	0.0
6	0.579	21.381	16.30053	0.0	0.32200	0.0	0.0
7	0.669	21.257	16.18234	0.0	0.37399	0.0	0.0
8	0.750	21.133	16.06412	0.0	0.42164	0.0	0.0
9	0.823	21.009	15.94587	0.0	0.46485	0.0	0.0
10	0.888	20.885	15.82758	0.0	0.50355	0.0	0.0
11	0.943	20.761	15.70926	0.0	0.53762	0.0	0.0
12	0.990	20.637	15.59091	0.0	0.56698	0.0	0.0
13	1.029	20.512	15.47253	0.0	0.59153	0.0	0.0
14	1.059	20.388	15.35411	0.0	0.61117	0.0	0.0
15	1.080	20.263	15.23566	0.0	0.62581	0.0	0.0
16	1.093	20.139	15.11718	0.0358495	0.63532	249.891	204.912
17	1.098	20.014	14.99874	0.0364196	0.64135	249.891	205.716
18	1.093	19.889	14.88034	0.0366233	0.64382	249.891	204.912
19	1.080	19.763	14.76197	0.0	0.64266	0.0	0.0
20	1.059	19.638	14.64358	0.0	0.63600	0.0	0.0
21	1.029	19.512	14.52515	0.0	0.62375	0.0	0.0
22	0.990	19.387	14.40668	0.0	0.60579	0.0	0.0
23	0.943	19.261	14.28819	0.0	0.58203	0.0	0.0
24	0.888	19.135	14.16966	0.0	0.55236	0.0	0.0
25	0.823	19.009	14.05109	0.0	0.51665	0.0	0.0
26	0.750	18.884	13.93250	0.0	0.47481	0.0	0.0
27	0.669	18.758	13.81387	0.0	0.42671	0.0	0.0
28	0.579	18.631	13.69521	0.0	0.37223	0.0	0.0
29	0.480	18.505	13.57651	0.0	0.31127	0.0	0.0
30	0.373	18.379	13.45778	0.0	0.24369	0.0	0.0
31	0.257	18.253	13.33902	0.0	0.16937	0.0	0.0
32	0.133	18.127	13.22022	0.0	0.08818	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0
16	250.	0.	0.	0.	0.	0.	0.	0.	0.	125.	125.

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

17	250.	0.	0.	0.	0.	0.	0.	0.	0.	125.	125.
18	250.	0.	0.	0.	0.	0.	0.	0.	0.	125.	125.

OUTPUT AT X=42.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77297	0.0	0.07217	0.0	0.0
3	0.257	21.753	16.65489	0.0	0.14043	0.0	0.0
4	0.373	21.629	16.53679	0.0	0.20469	0.0	0.0
5	0.480	21.505	16.41865	0.0	0.26487	0.0	0.0
6	0.579	21.382	16.30048	0.0	0.32088	0.0	0.0
7	0.669	21.258	16.18228	0.0	0.37264	0.0	0.0
8	0.750	21.134	16.06405	0.0	0.42006	0.0	0.0
9	0.823	21.010	15.94579	0.0	0.46305	0.0	0.0
10	0.888	20.885	15.82749	0.0	0.50152	0.0	0.0
11	0.943	20.761	15.70917	0.0	0.53537	0.0	0.0
12	0.990	20.637	15.59081	0.0	0.56451	0.0	0.0
13	1.029	20.513	15.47241	0.0	0.58884	0.0	0.0
14	1.059	20.388	15.35399	0.0	0.60827	0.0	0.0
15	1.080	20.264	15.23553	0.0	0.62269	0.0	0.0
16	1.093	20.139	15.11704	0.0	0.63200	0.0	0.0
17	1.098	20.014	14.99852	0.0491697	0.63611	248.915	204.912
18	1.093	19.890	14.88004	0.0502354	0.63688	250.871	205.716
19	1.080	19.764	14.76162	0.0509162	0.63427	252.866	204.912
20	1.059	19.639	14.64325	0.0	0.62818	0.0	0.0
21	1.029	19.513	14.52485	0.0	0.61651	0.0	0.0
22	0.990	19.387	14.40641	0.0	0.59914	0.0	0.0
23	0.943	19.262	14.28794	0.0	0.57596	0.0	0.0
24	0.888	19.136	14.16943	0.0	0.54687	0.0	0.0
25	0.823	19.010	14.05089	0.0	0.51176	0.0	0.0
26	0.750	18.884	13.93232	0.0	0.47052	0.0	0.0
27	0.669	18.758	13.81372	0.0	0.42302	0.0	0.0
28	0.579	18.632	13.69508	0.0	0.36915	0.0	0.0
29	0.480	18.506	13.57641	0.0	0.30879	0.0	0.0
30	0.373	18.379	13.45771	0.0	0.24183	0.0	0.0
31	0.257	18.253	13.33897	0.0	0.16812	0.0	0.0
32	0.133	18.127	13.22020	0.0	0.08756	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	224.	25.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	226.	25.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	228.	25.

OUTPUT AT X=45.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

2	0.133	21.877	16.77295	0.0	0.07184	0.0	0.0
3	0.257	21.753	16.65486	0.0	0.13977	0.0	0.0
4	0.373	21.629	16.53674	0.0	0.20369	0.0	0.0
5	0.480	21.506	16.41859	0.0	0.26353	0.0	0.0
6	0.579	21.382	16.30041	0.0	0.31920	0.0	0.0
7	0.669	21.258	16.18219	0.0	0.37062	0.0	0.0
8	0.750	21.134	16.06395	0.0	0.41770	0.0	0.0
9	0.823	21.010	15.94567	0.0	0.46034	0.0	0.0
10	0.888	20.886	15.82736	0.0	0.49846	0.0	0.0
11	0.943	20.762	15.70902	0.0	0.53196	0.0	0.0
12	0.990	20.637	15.59064	0.0	0.56075	0.0	0.0
13	1.029	20.513	15.47224	0.0	0.58473	0.0	0.0
14	1.059	20.389	15.35380	0.0	0.60381	0.0	0.0
15	1.080	20.264	15.23533	0.0	0.61787	0.0	0.0
16	1.093	20.140	15.11682	0.0	0.62683	0.0	0.0
17	1.098	20.015	14.99828	0.0644399	0.63058	248.914	204.912
18	1.093	19.890	14.87981	0.0657223	0.63124	250.871	205.716
19	1.080	19.765	14.76139	0.0666074	0.62875	252.865	204.912
20	1.059	19.639	14.64304	0.0	0.62304	0.0	0.0
21	1.029	19.514	14.52465	0.0	0.61173	0.0	0.0
22	0.990	19.388	14.40623	0.0	0.59474	0.0	0.0
23	0.943	19.262	14.28777	0.0	0.57195	0.0	0.0
24	0.888	19.136	14.16928	0.0	0.54325	0.0	0.0
25	0.823	19.010	14.05076	0.0	0.50853	0.0	0.0
26	0.750	18.884	13.93221	0.0	0.46767	0.0	0.0
27	0.669	18.758	13.81362	0.0	0.42057	0.0	0.0
28	0.579	18.632	13.69500	0.0	0.36710	0.0	0.0
29	0.480	18.506	13.57634	0.0	0.30715	0.0	0.0
30	0.373	18.379	13.45766	0.0	0.24059	0.0	0.0
31	0.257	18.253	13.33894	0.0	0.16730	0.0	0.0
32	0.133	18.127	13.22018	0.0	0.08714	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	124.	100.	25.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	125.	100.	25.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	126.	101.	25.

OUTPUT AT X=48.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77294	0.0	0.07153	0.0	0.0
3	0.257	21.753	16.65484	0.0	0.13914	0.0	0.0
4	0.373	21.629	16.53670	0.0	0.20275	0.0	0.0
5	0.480	21.506	16.41854	0.0	0.26228	0.0	0.0
6	0.579	21.382	16.30034	0.0	0.31763	0.0	0.0
7	0.669	21.258	16.18211	0.0	0.36873	0.0	0.0
8	0.750	21.134	16.06385	0.0	0.41548	0.0	0.0
9	0.823	21.010	15.94556	0.0	0.45780	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

10	0.888	20.886	15.82724	0.0	0.49560	0.0	0.0	
11	0.943	20.762	15.70888	0.0	0.52878	0.0	0.0	
12	0.990	20.638	15.59049	0.0	0.55724	0.0	0.0	
13	1.029	20.513	15.47207	0.0	0.58090	0.0	0.0	
14	1.059	20.389	15.35362	0.0	0.59964	0.0	0.0	
15	1.080	20.265	15.23514	0.0	0.61338	0.0	0.0	
16	1.093	20.140	15.11662	0.0	0.62202	0.0	0.0	
17	1.098	20.016	14.99807	0.0813618	0.62544	248.914	204.912	
18	1.093	19.891	14.87959	0.0828674	0.62599	250.870	205.716	
19	1.080	19.765	14.76118	0.0839817	0.62362	252.865	204.912	
20	1.059	19.640	14.64284	0.0	0.61825	0.0	0.0	
21	1.029	19.514	14.52446	0.0	0.60729	0.0	0.0	
22	0.990	19.388	14.40606	0.0	0.59065	0.0	0.0	
23	0.943	19.263	14.28762	0.0	0.56822	0.0	0.0	
24	0.888	19.137	14.16914	0.0	0.53987	0.0	0.0	
25	0.823	19.011	14.05064	0.0	0.50552	0.0	0.0	
26	0.750	18.885	13.93210	0.0	0.46503	0.0	0.0	
27	0.669	18.758	13.81353	0.0	0.41830	0.0	0.0	
28	0.579	18.632	13.69492	0.0	0.36520	0.0	0.0	
29	0.480	18.506	13.57628	0.0	0.30563	0.0	0.0	
30	0.373	18.380	13.45761	0.0	0.23944	0.0	0.0	
31	0.257	18.253	13.33891	0.0	0.16653	0.0	0.0	
32	0.133	18.127	13.22017	0.0	0.08676	0.0	0.0	
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0	

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	124.	124.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	125.	125.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	126.	126.

OUTPUT AT X=51.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77293	0.0	0.07124	0.0	0.0
3	0.257	21.753	16.65481	0.0	0.13856	0.0	0.0
4	0.373	21.630	16.53666	0.0	0.20188	0.0	0.0
5	0.480	21.506	16.41849	0.0	0.26111	0.0	0.0
6	0.579	21.382	16.30028	0.0	0.31616	0.0	0.0
7	0.669	21.258	16.18203	0.0	0.36696	0.0	0.0
8	0.750	21.134	16.06376	0.0	0.41342	0.0	0.0
9	0.823	21.010	15.94546	0.0	0.45544	0.0	0.0
10	0.888	20.886	15.82712	0.0	0.49293	0.0	0.0
11	0.943	20.762	15.70875	0.0	0.52580	0.0	0.0
12	0.990	20.638	15.59035	0.0	0.55396	0.0	0.0
13	1.029	20.514	15.47192	0.0	0.57731	0.0	0.0
14	1.059	20.390	15.35346	0.0	0.59576	0.0	0.0
15	1.080	20.265	15.23496	0.0	0.60919	0.0	0.0
16	1.093	20.141	15.11643	0.0	0.61752	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

17	1.098	20.016	14.99786	0.0998255	0.62064	248.914	204.912
18	1.093	19.891	14.87938	0.1015602	0.62109	250.870	205.716
19	1.080	19.766	14.76097	0.1029275	0.61883	252.865	204.912
20	1.059	19.640	14.64265	0.0	0.61378	0.0	0.0
21	1.029	19.515	14.52429	0.0	0.60315	0.0	0.0
22	0.990	19.389	14.40590	0.0	0.58683	0.0	0.0
23	0.943	19.263	14.28747	0.0	0.56473	0.0	0.0
24	0.888	19.137	14.16901	0.0	0.53673	0.0	0.0
25	0.823	19.011	14.05052	0.0	0.50271	0.0	0.0
26	0.750	18.885	13.93200	0.0	0.46256	0.0	0.0
27	0.669	18.759	13.81344	0.0	0.41618	0.0	0.0
28	0.579	18.632	13.69485	0.0	0.36343	0.0	0.0
29	0.480	18.506	13.57622	0.0	0.30420	0.0	0.0
30	0.373	18.380	13.45757	0.0	0.23837	0.0	0.0
31	0.257	18.253	13.33888	0.0	0.16581	0.0	0.0
32	0.133	18.127	13.22015	0.0	0.08640	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER
NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	224.	25.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	226.	25.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	228.	25.

OUTPUT AT X=54.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77291	0.0	0.07097	0.0	0.0
3	0.257	21.753	16.65479	0.0	0.13802	0.0	0.0
4	0.373	21.630	16.53863	0.0	0.20106	0.0	0.0
5	0.480	21.506	16.41844	0.0	0.26001	0.0	0.0
6	0.579	21.382	16.30022	0.0	0.31479	0.0	0.0
7	0.669	21.258	16.18196	0.0	0.36531	0.0	0.0
8	0.750	21.135	16.06368	0.0	0.41148	0.0	0.0
9	0.823	21.011	15.94536	0.0	0.45322	0.0	0.0
10	0.888	20.887	15.82701	0.0	0.49043	0.0	0.0
11	0.943	20.763	15.70863	0.0	0.52302	0.0	0.0
12	0.990	20.639	15.59022	0.0	0.55089	0.0	0.0
13	1.029	20.514	15.47178	0.0	0.57395	0.0	0.0
14	1.059	20.390	15.35330	0.0	0.59211	0.0	0.0
15	1.080	20.266	15.23479	0.0	0.60526	0.0	0.0
16	1.093	20.141	15.11625	0.0	0.61330	0.0	0.0
17	1.098	20.017	14.99767	0.1197359	0.61613	248.914	204.912
18	1.093	19.892	14.87919	0.1217045	0.61649	250.870	205.716
19	1.080	19.767	14.76079	0.1233484	0.61433	252.865	204.912
20	1.059	19.641	14.64247	0.0	0.60958	0.0	0.0
21	1.029	19.515	14.52413	0.0	0.59926	0.0	0.0
22	0.990	19.389	14.40575	0.0	0.58325	0.0	0.0
23	0.943	19.263	14.28734	0.0	0.56146	0.0	0.0
24	0.888	19.137	14.16889	0.0	0.53377	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

25	0.823	19.011	14.05041	0.0	0.50007	0.0	0.0	
26	0.750	18.885	13.93190	0.0	0.46025	0.0	0.0	
27	0.669	18.759	13.81336	0.0	0.41419	0.0	0.0	
28	0.579	18.633	13.69478	0.0	0.36177	0.0	0.0	
29	0.480	18.506	13.57617	0.0	0.30287	0.0	0.0	
30	0.373	18.380	13.45753	0.0	0.23737	0.0	0.0	
31	0.257	18.253	13.33885	0.0	0.16514	0.0	0.0	
32	0.133	18.127	13.22014	0.0	0.08606	0.0	0.0	
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0	

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	124.	124.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	125.	125.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	126.	126.

OUTPUT AT X=57.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT L G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77290	0.0	0.07072	0.0	0.0
3	0.257	21.753	16.65476	0.0	0.13751	0.0	0.0
4	0.373	21.630	16.53659	0.0	0.20029	0.0	0.0
5	0.480	21.506	16.41839	0.0	0.25898	0.0	0.0
6	0.579	21.382	16.30016	0.0	0.31350	0.0	0.0
7	0.669	21.259	16.18189	0.0	0.36375	0.0	0.0
8	0.750	21.135	16.06360	0.0	0.40966	0.0	0.0
9	0.823	21.011	15.94527	0.0	0.45113	0.0	0.0
10	0.888	20.887	15.82691	0.0	0.48807	0.0	0.0
11	0.943	20.763	15.70852	0.0	0.52039	0.0	0.0
12	0.990	20.639	15.59010	0.0	0.54800	0.0	0.0
13	1.029	20.515	15.47164	0.0	0.57079	0.0	0.0
14	1.059	20.390	15.35315	0.0	0.58868	0.0	0.0
15	1.080	20.266	15.23463	0.0	0.60156	0.0	0.0
16	1.093	20.142	15.11608	0.0	0.60933	0.0	0.0
17	1.098	20.017	14.99749	0.1410095	0.61189	248.913	204.912
18	1.093	19.892	14.87900	0.1432165	0.61216	250.870	205.706
19	1.080	19.767	14.76061	0.1451596	0.61010	252.864	204.912
20	1.059	19.641	14.64231	0.0	0.60563	0.0	0.0
21	1.029	19.516	14.52398	0.0	0.59559	0.0	0.0
22	0.990	19.390	14.40561	0.0	0.57988	0.0	0.0
23	0.943	19.264	14.28721	0.0	0.55838	0.0	0.0
24	0.888	19.138	14.16878	0.0	0.53099	0.0	0.0
25	0.823	19.012	14.05031	0.0	0.49759	0.0	0.0
26	0.750	18.885	13.93181	0.0	0.45807	0.0	0.0
27	0.669	18.759	13.81328	0.0	0.41231	0.0	0.0
28	0.579	18.633	13.69472	0.0	0.36020	0.0	0.0
29	0.480	18.506	13.57612	0.0	0.30161	0.0	0.0
30	0.373	18.380	13.45749	0.0	0.23642	0.0	0.0
31	0.257	18.253	13.33882	0.0	0.16451	0.0	0.0
32	0.133	18.127	13.22013	0.0	0.08575	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	249.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	251.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	253.

OUTPUT AT X=60.00 CM

J	VELOCITY CM/SEC	TEMP V DEG C	MIX RAT L G/KG	MIX RAT L G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.)	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77289	0.0	0.07047	0.0	0.0
3	0.257	21.753	16.65474	0.0	0.13702	0.0	0.0
4	0.373	21.630	16.53656	0.0	0.19956	0.0	0.0
5	0.480	21.506	16.41835	0.0	0.25800	0.0	0.0
6	0.579	21.383	16.30010	0.0	0.31227	0.0	0.0
7	0.669	21.259	16.18183	0.0	0.36228	0.0	0.0
8	0.750	21.135	16.06352	0.0	0.40794	0.0	0.0
9	0.823	21.011	15.94518	0.0	0.44916	0.0	0.0
10	0.888	20.887	15.82681	0.0	0.48585	0.0	0.0
11	0.943	20.763	15.70841	0.0	0.51791	0.0	0.0
12	0.990	20.639	15.58998	0.0	0.54526	0.0	0.0
13	1.029	20.515	15.47151	0.0	0.56780	0.0	0.0
14	1.059	20.391	15.35301	0.0	0.58543	0.0	0.0
15	1.080	20.267	15.23448	0.0	0.59805	0.0	0.0
16	1.093	20.142	15.11592	0.0	0.60557	0.0	0.0
17	1.098	20.018	14.99732	0.1635727	0.60787	248.913	204.912
18	1.093	19.893	14.87883	0.1660219	0.60806	250.869	205.716
19	1.080	19.768	14.76044	0.1682865	0.60609	252.864	204.912
20	1.059	19.642	14.64215	0.0	0.60189	0.0	0.0
21	1.029	19.516	14.52383	0.0	0.59213	0.0	0.0
22	0.990	19.390	14.40548	0.0	0.57669	0.0	0.0
23	0.943	19.264	14.28709	0.0	0.55547	0.0	0.0
24	0.888	19.138	14.16867	0.0	0.52836	0.0	0.0
25	0.823	19.012	14.05022	0.0	0.49525	0.0	0.0
26	0.750	18.886	13.93173	0.0	0.45601	0.0	0.0
27	0.669	18.759	13.81321	0.0	0.41054	0.0	0.0
28	0.579	18.633	13.69466	0.0	0.35872	0.0	0.0
29	0.480	18.507	13.57607	0.0	0.30042	0.0	0.0
30	0.373	18.380	13.45745	0.0	0.23553	0.0	0.0
31	0.257	18.253	13.33880	0.0	0.16391	0.0	0.0
32	0.133	18.127	13.22012	0.0	0.08545	0.0	0.0
33	0.)	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	249.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	251.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	253.

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

OUTPUT AT X=63.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77288	0.0	0.07025	0.0	0.0
3	0.257	21.753	16.65472	0.0	0.13656	0.0	0.0
4	0.373	21.630	16.53653	0.0	0.19887	0.0	0.0
5	0.480	21.506	16.41831	0.0	0.25708	0.0	0.0
6	0.579	21.383	16.30005	0.0	0.31111	0.0	0.0
7	0.669	21.259	16.18177	0.0	0.36088	0.0	0.0
8	0.750	21.135	16.06345	0.0	0.40630	0.0	0.0
9	0.823	21.011	15.94510	0.0	0.44728	0.0	0.0
10	0.888	20.888	15.82672	0.0	0.48373	0.0	0.0
11	0.943	20.764	15.70831	0.0	0.51556	0.0	0.0
12	0.990	20.639	15.58987	0.0	0.54267	0.0	0.0
13	1.029	20.515	15.47139	0.0	0.56497	0.0	0.0
14	1.059	20.391	15.35288	0.0	0.58235	0.0	0.0
15	1.080	20.267	15.23434	0.0	0.59473	0.0	0.0
16	1.093	20.143	15.11577	0.0	0.60200	0.0	0.0
17	1.098	20.018	14.99716	0.1873600	0.60406	248.913	204.912
18	1.093	19.893	14.87867	0.1900547	0.60417	250.869	205.716
19	1.080	19.768	14.76028	0.1926622	0.60229	252.864	204.912
20	1.059	19.642	14.64200	0.0	0.59835	0.0	0.0
21	1.029	19.516	14.52370	0.0	0.58884	0.0	0.0
22	0.990	19.390	14.40535	0.0	0.57367	0.0	0.0
23	0.943	19.264	14.28698	0.0	0.55271	0.0	0.0
24	0.888	19.138	14.16857	0.0	0.52587	0.0	0.0
25	0.823	19.012	14.05013	0.0	0.49302	0.0	0.0
26	0.750	18.886	13.93165	0.0	0.45406	0.0	0.0
27	0.669	18.760	13.81314	0.0	0.40886	0.0	0.0
28	0.579	18.633	13.69460	0.0	0.35732	0.0	0.0
29	0.480	18.507	13.57603	0.0	0.29930	0.0	0.0
30	0.373	18.380	13.45742	0.0	0.23468	0.0	0.0
31	0.257	18.254	13.33878	0.0	0.16335	0.0	0.0
32	0.133	18.127	13.22010	0.0	0.08516	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

	NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN														
INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	124.	124.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	125.	125.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	126.	126.

OUTPUT AT X=66.00 CM

J	VELOCITY CM/SEC	TEMP DEG C	V MIX RAT G/KG	L MIX RAT G/KG	SUPERSAT PERCENT	ACT DROPS PER CC	DROP FLUX PER SEC
1	0.0	22.000	16.89101	0.0	0.00000	0.0	0.0
2	0.133	21.877	16.77287	0.0	0.07003	0.0	0.0
3	0.257	21.753	16.65470	0.0	0.13612	0.0	0.0

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

4	0.373	21.630	16.53650	0.0	0.19821	0.0	0.0
5	0.480	21.506	16.41827	0.0	0.25620	0.0	0.0
6	0.579	21.383	16.30000	0.0	0.31001	0.0	0.0
7	0.669	21.259	16.18171	0.0	0.35956	0.0	0.0
8	0.750	21.135	16.06338	0.0	0.40475	0.0	0.0
9	0.823	21.012	15.94503	0.0	0.44550	0.0	0.0
10	0.888	20.888	15.82664	0.0	0.48172	0.0	0.0
11	0.943	20.764	15.70821	0.0	0.51332	0.0	0.0
12	0.990	20.640	15.58976	0.0	0.54020	0.0	0.0
13	1.029	20.516	15.47128	0.0	0.56227	0.0	0.0
14	1.059	20.392	15.35276	0.0	0.57942	0.0	0.0
15	1.080	20.267	15.23421	0.0	0.59157	0.0	0.0
16	1.093	20.143	15.11563	0.0	0.59861	0.0	0.0
17	1.098	20.019	14.99701	0.2123126	0.60044	248.913	204.912
18	1.093	19.894	14.87851	0.2152557	0.60047	250.869	205.716
19	1.080	19.768	14.76013	0.2182273	0.59867	252.864	204.912
20	1.059	19.643	14.64186	0.0	0.59498	0.0	0.0
21	1.029	19.517	14.52357	0.0	0.58572	0.0	0.0
22	0.990	19.391	14.40523	0.0	0.57079	0.0	0.0
23	0.943	19.265	14.28687	0.0	0.55009	0.0	0.0
24	0.888	19.139	14.16847	0.0	0.52350	0.0	0.0
25	0.823	19.012	14.05004	0.0	0.49091	0.0	0.0
26	0.750	18.886	13.93157	0.0	0.45220	0.0	0.0
27	0.669	18.760	13.81308	0.0	0.40727	0.0	0.0
28	0.579	18.633	13.69455	0.0	0.35598	0.0	0.0
29	0.480	18.507	13.57598	0.0	0.29822	0.0	0.0
30	0.373	18.380	13.45739	0.0	0.23388	0.0	0.0
31	0.257	18.254	13.33876	0.0	0.16281	0.0	0.0
32	0.133	18.127	13.22009	0.0	0.08489	0.0	0.0
33	0.0	18.000	13.10140	0.0	-0.00000	0.0	0.0

TOTAL FLUX OF ACTIVATED DROPS= 615.540 PER SEC

DISTRIBUTION OF DROPS BY SIZE AND POSITION IN CHAMBER

NUMBER OF DROPS/CC WITH RADIUS (MICRONS) LESS THAN

INDEX	0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0
17	249.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	249.
18	251.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	251.
19	253.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	253.

* END SIMULATION *

Figure 3-47. Sample Output of the Phoretic Continuous Flow Diffusion Experiment Simulation - Example 2 (Cont.)

3.2.7 Two-Dimensional Static Diffusion Liquid Model

Previous SDL models used only a single space dimension, the coordinate normal to the chamber plates (here labelled the Z-coordinate). In other words, these models assumed that gradients in the values of all variables in the coordinate parallel to the chamber plates were negligible. For studies of droplet formation on a uniformly distribured aerosol, in regions away from the edges of the chamber plates, this assumption introduces little error. However, experiments have now been proposed which depend essentially on the effects of gradients in the radial coordinate. These experiments are of two basic types. In the first type, a single ice particle will be grown near the center of the chamber. In the second, a "thermal probe", whose temperature can be varied independently of the chamber plate temperatures, will be inserted into the center of the chamber.

The model describes a cylindrical section of the SDL chamber, bounded on its upper and lower surfaces by the chamber plates, and centered on the axis of symmetry of the chamber. It is an axisymmetric model; angular variations are neglected. The coordinate normal to the chamber plates is again the Z-coordinate. The primary difference between this model and previous SDL models is the numerical approach to solution of the heat conduction and vapor diffusion equations in these coordinates. Droplet nucleation and growth are treated exactly as in earlier models. The model provides for insertion of a cylindrical thermal probe concentric with the axis of symmetry. A model of ice particle growth has not yet been incorporated in the program.

The input conditions required to use the Two-Dimensional SDL Model are:

1. The thermal accommodation coefficient (ALPHA) and the condensation coefficient (BETA).
2. The aerosol distribution name (ADIST).
3. The number of classes of aerosol particles (NCLASS).
4. For a user generated aerosol distribution: the distribution of aerosol particle number concentration (NZERO) vs. critical supersaturation (SIGMAC), in exactly the same manner as given for the adiabatic expansion module,

or

For the CxS^K aerosol distribution function where S is critical supersaturation: the total number of particles per CC in the aerosol (ANBAR), the value of the exponent K in the distribution (AK), the lower bound on the supersaturation (SMIN), and the upper bound on the supersaturation (SMAX).

5. A user supplied identifier of up to 8 alphanumeric characters, used to label the output.
6. SDL chamber plate spacing, in Centimeters (SDLHT), and number of grid points (NSPACE) desired in the Z-direction (normal to plates). Can take any value from 5 to 21. If DZ is the desired grid spacing (in CM), them SDLHT = (NSPACE-1)*DZ.
8. Radius of cylindrical region to be modeled (SDLWID).

   Maximum grid index (MSPACE) in the X-direction (radial). If DX is the desired grid spacing in the X-direction, then SDLWID = (MSPACE-1)*DX.

   Minimum grid index in the radial direction (MMIN). For simulation of a thermal probe experiment, MMIN must be greater than one. If so, the radius of thermal probe is (MMIN-1)*DX. If MMIN is blank on the input card, the program sets MMIN to 1. If MMIN=1, there are no gradients in the radial direction in this model and the results will be a function of Z only. The option MMIN=1 will be needed, however, for incorporation of the ice crystal growth simulation.

   The maximum value for MSPACE is 41. MMIN can take any value less than MSPACE-4.
9. Time at the beginning of the experiment (TMZERO), time at the end of the experiment (TIMEND), time step for integration of model equations (DELTAT), and time interval at which printed output is desired (TIMOUT), all in seconds.
10. Time during which chamber plate temperatures are changing (TMRAMP), in seconds. rate of change of top plate temperature (DTW1), and rate of change of bottom plate temperature (DTW2), in degrees K/second.

11. Initial chamber temperature (TMZERO) (both plates are assumed to be at temperature TZERO at time TMZERO), and initial chamber pressure (PZERO).

The input stream for the Two-Dimensional Statis Diffusion Liquid Module consists of parameters delineated in Figure 3-48. These parameters are input using punched cards. The format of the data cards is described in Figures 3-49. Note that more than one experiment may be run at the same time by submitting multiple input data sets as described in paragraph 3.3.

3.2.7.1 Two Dimensional Static Diffusion Liquid Experiment Example

Examples are given to illustrate the simulation of the Two-Dimensional Static Diffusion Liquid Experiment. The listings of the input data cards are given in Figures 3-50 and 3-52. The corresponding output listings are shown in Figures 3-51 and 3-53.

Parameters	Units
Experiment Name	(Designated name for the Two-Dimensional Static Diffusion Liquid Experiment)
Thermal accommodation coefficient	
Condensation coefficient	
Aerosol distribution name	
Number of particle classes for each class:	
Number of particles	
Critical supersaturation	
Number of particles	
Exponent (K)	
Lower bound on supersaturation	
Upper bound on supersaturation	
User supplied output identifier	
SDL chamber plate spacing	centimeters
Number of grid points in the Z-direction	
Radius of cylindrical region to be modeled	
Maximum grid index in the X-direction (radial)	
Minimum grid index in the radial direction	
Time at the beginning of the experiment	seconds
Time at the end of the experiment	seconds
Time step for integration of model equations	seconds
Time interval at which printed output desired	seconds
Time during which chamber plate temperatures are changing	seconds
Rate of change of top plate temperature	degrees K/second

Figure 3-48. Input Conditions for Two-Dimensional Static Diffusion Module

Parameters	Units
Rate of change of bottom plate temperature	degrees K/second
Initial chamber temperature	degrees K
Initial chamber pressure	millibars

Figure 3.48. Input Conditions for Two-Dimensional Static Diffusion Module (Cont)

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
1	1-8	Experiment option	A8	SDLZD
2	1-10	Thermal accommodation coefficient	F10.5	
2	11-20	Condensation coefficient	F10.5	
3	1-8	Aerosol distribution name There are two options: N vs SC - User-generated distribution, number concentration vs critical supersaturation. C*S to K - Aerosol number concentration follows C*S**K distribution where S is critical supersaturation.	A8	Right justified in field
4	1-5	Number of particle calsses - M	I5	Right justified in field
I+4	1-10	Number of particles in the Ith class	F10.5	
I+4	11-20	Critical supersaturation of the Ith class (I=1, 2, 3, ..., M)		Actual value, not percent
M+4	1-10	Total number of particles per CC in the aerosol	F10.5	
M+4	11-20	Value of the exponent K in the distribution	F10.5	
M+4	21-30	Lower bound on the supersaturation	F10.5	
M+4	31-40	Upper bound on the supersaturation	F10.5	
M+5	1-8	User supplied name for output identification	A8	
M+6	1-10	Chamber plate spacing	F10.5	
M+6	11-20	Number of grid points in the Z-direction	I10	Right justified in field
M+7	1-10	Radius of cylindrical region to be modeled	F10.5	
M+7	11-20	Maximum grid index in the X-direction (radial)	I10	Right justified in field
M+7	21-30	Minimum grid index in the radial direction	I10	Right justified in field
M+8	1-10	Time at the beginning of the experiment	F10.5	

Figure 3-49. Format of Input Data Cards for Two-Dimensional Static Diffusion Liquid Simulation Run

CARD NO.	COLUMNS	PARAMETER	FORMAT	SPECIAL CONSIDERATIONS
M+8	11-20	Time at the end of the experiment	F10.5	
M+8	21-30	Time step for integration of model equations	F10.5	
M+8	31-40	Time interval at which printed output is desired	F10.5	
M+9	1-10	Time during which chamber plate temperatures are changing	F10.5	
M+9	11-20	Rate of change of top plate temperature	F10.5	
M+9	21-30	Rate of change of bottom plate temperature	F10.5	
M+10	1-10	Initial Chamber Temperature (Both plates are assumed to be at temperature TZERO at time TMZERO)	F10.5	
M+10	11-20	Initial Chamber Pressure	F10.5	

(F10.5 is standard FORTRAN format for a real number in which 10 is the width of the field and 5 specifies that there are 5 digits to the right of the decimal point. The number may be input with or without a decimal point.)

Figure 3-49. Format of Input Data Cards for Two-Dimensional Static Diffusion Liquid Simulation Run

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
SDL2D EX
   1.          .03
 N US SC
          1
 100.          .002
  TEST 1
   1.                6
   2.               11          3
   0.        10.           .0625     1.
   5.          .4       -.4
   20.      1000.
STOP SIM
```

Figure 3-50. Input Card Images of the Two-Dimensional Static Diffusion Liquid Experiment Run - Example 1

```
TWO-DIMENSIONAL SEL MODEL RUN   TEST 1
CHAMBER    TE SPACING            1.000 CM
RADIUS OF MODELLED REGION        2.000 CM
INITIAL CHAMBER TEMPERATURE     20.000 DEG C
INITIAL CHAMBER PRESSURE      1000.000 MB
DURATION OF PLATE TEMP CHANGE    5.000 SEC
TOP PLATE TEMP RAMP RATE         0.400 DEG/SEC
BOTTOM PLATE TEMP RAMP RATE     -0.400 DEG/SEC
TIME AT START OF EXPERIMENT      0.0   SEC
DURATION OF EXPERIMENT          10.000 SEC
TIME STEP                        0.063 SEC
OUTPUT TIME INCREMENT            1.000 SEC
THERMAL PROBE RADIUS             0.400 CM

AEROSOL/DROPLET PARAMETERS

 THERMAL ACCOM. COEFFICIENT IS  1.000
 CONDENSATION COEFFICIENT IS    0.030

 AERSOL DISTRIBUTION IS         N VS SC

CLASS        NUMBER      CRITICAL      CRITICAL      INITIAL
  NO.  CONCENTRATION      SUPERSAT        RADIUS       RADIUS
          (NO/CC)       (PERCENT)     (MICRONS)    (MICRONS)
    1       100.00         0.20000       0.35829      0.20686
```


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1

```
TIME=      )0 SEC
P=1000.00 MB

TEMPERATURE (DEG C)
I= 3   20.40000   20.24005   20.08007   19.92007   19.76007   19.60010
I= 4   20.40000   20.21823   20.06970   19.93090   19.78224   19.60012
I= 5   20.40000   20.21253   20.06668   19.93407   19.78804   19.60012
I= 6   20.40000   20.21095   20.06575   19.93502   19.78567   19.60012
I= 7   20.40000   20.21049   20.06553   19.93530   19.79014   19.60012
I= 8   20.40000   20.21036   20.06545   19.93539   19.79028   19.60012
I= 9   20.40000   20.21032   20.06542   19.93542   19.79032   19.60012
I=10   20.40000   20.21030   20.06542   19.93542   19.79033   19.60012
I=11   20.40000   20.21030   20.06541   19.93543   19.79034   19.60012

SUPERSATURATION (PERCENT)
I= 3    0.00037   -0.07055   -0.05426    0.07671    0.09502    0.00013
I= 4    0.00037    0.05824    0.01004    0.00953   -0.04279    0.00004
I= 5    0.00037    0.09381    0.02875   -0.01017   -0.07862    0.00002
I= 6    0.00037    0.10363    0.03427   -0.01604   -0.08890    0.00001
I= 7    0.00037    0.10647    0.03591   -0.01781   -0.09182    0.00001
I= 8    0.00037    0.10731    0.03641   -0.01834   -0.09269    0.00001
I= 9    0.00037    0.10756    0.03655   -0.01851   -0.09295    0.00001
I=10    0.00037    0.10763    0.03660   -0.01856   -0.09303    0.00001
I=11    0.00037    0.10765    0.03661   -0.01857   -0.09304    0.00001

LIQUID MIXING RATIO (GM/KG)
I= 3    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I= 4    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I= 5    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I= 6    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I= 7    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I= 8    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I= 9    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I=10    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000
I=11    0.00000    0.00000    0.00000    0.00000    0.00000    0.00000

LARGEST DROP RADIUS (MICRONS)
I= 3    0.20703    0.19120    0.19674    0.22206    0.23105    0.20671
I= 4    0.20703    0.21473    0.20782    0.20776    0.20146    0.20670
I= 5    0.20703    0.22273    0.21148    0.20420    0.19581    0.20670
I= 6    0.20703    0.22505    0.21259    0.20320    0.19437    0.20670
I= 7    0.20703    0.22571    0.21291    0.20291    0.19396    0.20670
I= 8    0.20703    0.22590    0.21301    0.20283    0.19384    0.20670
I= 9    0.20703    0.22596    0.21304    0.20280    0.19381    0.20670
I=10    0.20703    0.22597    0.21305    0.20280    0.19380    0.20670
I=11    0.20703    0.22598    0.21305    0.20279    0.19380    0.20670

NO. OF ACTIVATED DROPLETS/CC
I= 3    0.0        0.0        0.0        0.0        0.0        0.0
I= 4    0.0        0.0        0.0        0.0        0.0        0.0
I= 5    0.0        0.0        0.0        0.0        0.0        0.0
I= 6    0.0        0.0        0.0        0.0        0.0        0.0
I= 7    0.0        0.0        0.0        0.0        0.0        0.0
I= 8    0.0        0.0        0.0        0.0        0.0        0.0
I= 9    0.0        0.0        0.0        0.0        0.0        0.0
```

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

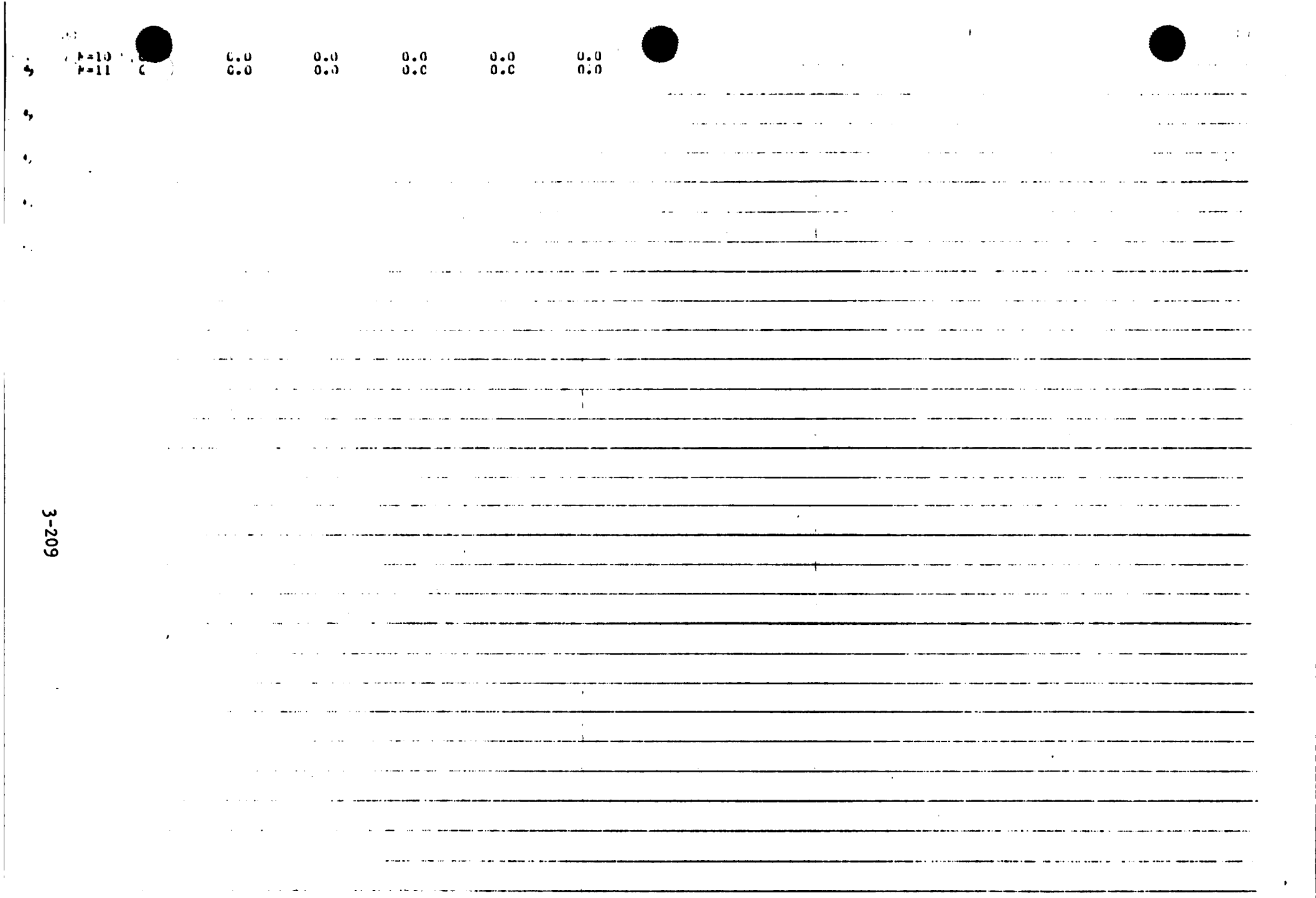


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

TIME= [illegible] SEC
P=1000.02 MB

TEMPERATURE (DEG C)

I= 3	20.80000	20.49017	20.16020	19.84021	19.52020	19.20032
I= 4	20.80000	20.45000	20.15032	19.85153	19.54272	19.20035
I= 5	20.80000	20.49313	20.14752	19.85492	19.54866	19.20035
I= 6	20.80000	20.45160	20.14672	19.85596	19.55035	19.20035
I= 7	20.80000	20.45117	20.14649	19.85625	19.55084	19.20035
I= 8	20.80000	20.45105	20.14643	19.85639	19.55100	19.20035
I= 9	20.80000	20.45101	20.14642	19.85643	19.55104	19.20035
I=10	20.80000	20.45100	20.14641	19.85644	19.55106	19.20035
I=11	20.80000	20.45100	20.14641	19.85644	19.55106	19.20035

SUPERSATURATION (PERCENT)

I= 3	0.00015	-0.03266	-0.00134	0.13044	0.13348	0.00031
I= 4	0.00015	0.09293	0.05988	0.06008	-0.00682	0.00016
I= 5	0.00015	0.12730	0.07730	0.03905	-0.04381	0.00013
I= 6	0.00015	0.13675	0.08226	0.03260	-0.05428	0.00012
I= 7	0.00015	0.13944	0.08365	0.03057	-0.05737	0.00011
I= 8	0.00015	0.14021	0.08403	0.02992	-0.05832	0.00011
I= 9	0.00015	0.14043	0.08413	0.02970	-0.05861	0.00011
I=10	0.00015	0.14049	0.08416	0.02963	-0.05871	0.00011
I=11	0.00015	0.14050	0.08416	0.02962	-0.05873	0.00011

LIQUID MIXING RATIO (GM/KG)

I= 3	0.00000	0.00000	0.00000	0.00000	0.00001	0.00000
I= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I= 5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I= 6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I= 7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I= 8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I= 9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I=10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
I=11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LARGEST DROP RADIUS (MICRONS)

I= 3	0.20726	0.19549	0.20347	0.23414	0.24324	0.20651
I= 4	0.20726	0.22155	0.21569	0.21547	0.20605	0.20650
I= 5	0.20726	0.23165	0.21992	0.21105	0.19973	0.20649
I= 6	0.20726	0.23482	0.22122	0.20978	0.19810	0.20649
I= 7	0.20726	0.23576	0.22160	0.20939	0.19764	0.20649
I= 8	0.20726	0.23603	0.22171	0.20927	0.19750	0.20649
I= 9	0.20726	0.23611	0.22174	0.20923	0.19745	0.20649
I=10	0.20726	0.23614	0.22175	0.20922	0.19744	0.20649
I=11	0.20726	0.23614	0.22175	0.20922	0.19744	0.20649

NC. OF ACTIVATED DROPLETS/CC

I= 3	0.0	0.0	0.0	0.0	0.0	0.0
I= 4	0.0	0.0	0.0	0.0	0.0	0.0
I= 5	0.0	0.0	0.0	0.0	0.0	0.0
I= 6	0.0	0.0	0.0	0.0	0.0	0.0
I= 7	0.0	0.0	0.0	0.0	0.0	0.0
I= 8	0.0	0.0	0.0	0.0	0.0	0.0
I= 9	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
 I=10          0.0       0.0       0.0       0.0       0.0
 I=11   0      0.0       0.0       0.0       0.0       0.0
```


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

TIME= ( )0 SEC
P=1000.0+ MB

TEMPERATURE (DEG C)

P= 3	21.20000	20.72034	20.24038	19.76040	19.28038	18.80066
P= 4	21.20000	20.69930	20.23116	19.77237	19.30334	18.80069
P= 5	21.20000	20.69393	20.22863	19.77604	19.30947	18.80070
P= 6	21.20000	20.69248	20.22796	19.77721	19.31123	18.80070
P= 7	21.20000	20.69208	20.22780	19.77759	19.31177	18.80070
P= 8	21.20000	20.69198	20.22776	19.77773	19.31194	18.80070
P= 9	21.20000	20.69195	20.22776	19.77778	19.31199	18.80070
P=10	21.20000	20.69194	20.22776	19.77779	19.31201	18.80070
P=11	21.20000	20.69194	20.22776	19.77780	19.31202	18.80070

SUPERSATURATION (PERCENT)

P= 3	0.00024	0.02770	0.09968	0.23410	0.20650	0.00058
P= 4	0.00024	0.15760	0.15693	0.15961	0.06308	0.00039
P= 5	0.00024	0.19081	0.17263	0.13682	0.02487	0.00034
P= 6	0.00024	0.19975	0.17680	0.12957	0.01388	0.00032
P= 7	0.00024	0.20220	0.17783	0.12717	0.01054	0.00032
P= 8	0.00024	0.20287	0.17804	0.12634	0.00949	0.00032
P= 9	0.00024	0.20304	0.17806	0.12605	0.00914	0.00031
P=10	0.00024	0.20308	0.17805	0.12594	0.00903	0.00031
P=11	0.00024	0.20309	0.17804	0.12592	0.00900	0.00031

LIQUID MIXING RATIO (GM/KG)

P= 3	0.00000	0.00000	0.00000	0.00001	0.00001	0.00000
P= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
P= 5	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
P= 6	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
P= 7	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
P= 8	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
P= 9	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
P=10	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
P=11	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000

LARGEST DROP RADIUS (MICRONS)

P= 3	0.20750	0.20951	0.22125	0.26505	0.26769	0.20631
P= 4	0.20750	0.23752	0.23711	0.23701	0.21812	0.20630
P= 5	0.20750	0.25034	0.24254	0.23048	0.21012	0.20629
P= 6	0.20750	0.25437	0.24413	0.22857	0.20805	0.20629
P= 7	0.20750	0.25558	0.24456	0.22798	0.20744	0.20629
P= 8	0.20750	0.25591	0.24466	0.22776	0.20725	0.20629
P= 9	0.20750	0.25601	0.24468	0.22769	0.20719	0.20629
P=10	0.20750	0.25603	0.24468	0.22767	0.20717	0.20629
P=11	0.20750	0.25603	0.24468	0.22766	0.20717	0.20629

NO. OF ACTIVATED DROPLETS/CC

P= 3	0.0	0.0	0.0	0.0	0.0	0.0
P= 4	0.0	0.0	0.0	0.0	0.0	0.0
P= 5	0.0	0.0	0.0	0.0	0.0	0.0
P= 6	0.0	0.0	0.0	0.0	0.0	0.0
P= 7	0.0	0.0	0.0	0.0	0.0	0.0
P= 8	0.0	0.0	0.0	0.0	0.0	0.0
P= 9	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

M=10		0.0	0.0	0.0	0.0	0.0
M=11		0.0	0.0	0.0	0.0	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

TIME= [illegible] SEC
P=1000.00 MB

TEMPERATURE (DEG C)

P= 3	21.60000	20.96057	20.32063	19.68065	19.04062	18.40110
P= 4	21.60000	20.94006	20.31218	19.69340	19.06411	18.40114
P= 5	21.60000	20.93490	20.31000	19.69741	19.07045	18.40115
P= 6	21.60000	20.93356	20.30948	19.69873	19.07232	18.40116
P= 7	21.60000	20.93321	20.30935	19.69919	19.07290	18.40116
P= 8	21.60000	20.93312	20.30939	19.69936	19.07309	18.40116
P= 9	21.60000	20.93310	20.30941	19.69942	19.07315	18.40116
P=10	21.60000	20.93310	20.30942	19.69945	19.07318	18.40116
P=11	21.60000	20.93310	20.30942	19.69945	19.07318	18.40116

SUPERSATURATION (PERCENT)

P= 3	0.00033	0.12545	0.24892	0.38893	0.31570	0.00102
P= 4	0.00033	0.25198	0.30139	0.30942	0.16855	0.00077
P= 5	0.00033	0.28381	0.31501	0.28448	0.12888	0.00070
P= 6	0.00033	0.29215	0.31823	0.27826	0.11724	0.00068
P= 7	0.00033	0.29431	0.31881	0.27340	0.11361	0.00067
P= 8	0.00033	0.29484	0.31881	0.27236	0.11242	0.00067
P= 9	0.00033	0.29495	0.31873	0.27196	0.11201	0.00067
P=10	0.00033	0.29497	0.31867	0.27181	0.11187	0.00067
P=11	0.00033	0.29496	0.31865	0.27177	0.11183	0.00067

LIQUID MIXING RATIO (GM/KG)

P= 3	0.00000	0.00000	0.00001	0.00001	0.00001	0.00000
P= 4	0.00000	0.00001	0.00001	0.00001	0.00001	0.00000
P= 5	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
P= 6	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
P= 7	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
P= 8	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
P= 9	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
P=10	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000
P=11	0.00000	0.00001	0.00001	0.00001	0.00000	0.00000

LARGEST DROP RADIUS (MICRONS)

P= 3	0.20774	0.22488	0.26213	0.34066	0.32167	0.20613
P= 4	0.20774	0.27150	0.28797	0.28862	0.24335	0.20611
P= 5	0.20774	0.29056	0.29661	0.27646	0.23137	0.20610
P= 6	0.20774	0.29659	0.29858	0.27283	0.22828	0.20610
P= 7	0.20774	0.29830	0.29953	0.27164	0.22735	0.20610
P= 8	0.20774	0.29875	0.29962	0.27121	0.22706	0.20610
P= 9	0.20774	0.29887	0.29961	0.27106	0.22696	0.20610
P=10	0.20774	0.29889	0.29960	0.27100	0.22692	0.20610
P=11	0.20774	0.29890	0.29959	0.27099	0.22692	0.20610

NO. OF ACTIVATED DROPLETS/CC

P= 3	0.0	0.0	0.0	0.0	0.0	0.0
P= 4	0.0	0.0	0.0	0.0	0.0	0.0
P= 5	0.0	0.0	0.0	0.0	0.0	0.0
P= 6	0.0	0.0	0.0	0.0	0.0	0.0
P= 7	0.0	0.0	0.0	0.0	0.0	0.0
P= 8	0.0	0.0	0.0	0.0	0.0	0.0
P= 9	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

K=10		0.0	0.0	0.0	0.0	0.0
K=11		0.0	0.0	0.0	0.0	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
TIME=     0 SEC
P=1000.13 MB

TEMPERATURE (DEG C)
P= 3   22.00000   21.20080   20.40093   19.60095   18.80052   18.00166
P= 4   22.00000   21.18096   20.39341   19.61463   18.82503   18.00171
P= 5   22.00000   21.17697   20.39162   19.61903   18.83162   18.00173
P= 6   22.00000   21.17483   20.39129   19.62054   18.83360   18.00173
P= 7   22.00000   21.17454   20.39128   19.62108   18.83423   18.00173
P= 8   22.00000   21.17448   20.39133   19.62129   18.83445   18.00173
P= 9   22.00000   21.17447   20.39136   19.62138   18.83453   18.00173
P=10   22.00000   21.17448   20.39138   19.62141   18.83456   18.00173
P=11   22.00000   21.17448   20.39138   19.62142   18.83456   18.00173

SUPERSATURATION (PERCENT)
P= 3    0.00043    0.25241    0.44590    0.59556    0.46233    0.00167
P= 4    0.00043    0.37507    0.49276    0.51011    0.31084    0.00136
P= 5    0.00043    0.40931    0.50393    0.48264    0.26944    0.00127
P= 6    0.00043    0.41293    0.50603    0.47326    0.25705    0.00125
P= 7    0.00043    0.41477    0.50607    0.46986    0.25307    0.00124
P= 8    0.00043    0.41514    0.50581    0.46856    0.25171    0.00123
P= 9    0.00043    0.41517    0.50561    0.46804    0.25123    0.00123
P=10    0.00043    0.41515    0.50550    0.46783    0.25105    0.00123
P=11    0.00043    0.41514    0.50547    0.46778    0.25101    0.00123

LIQUID MIXING RATIO (GM/KG)
P= 3    0.00000    0.00001    0.00002    0.00003    0.00001    0.00000
P= 4    0.00000    0.00001    0.00002    0.00003    0.00001    0.00000
P= 5    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
P= 6    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
P= 7    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
P= 8    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
P= 9    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
P=10    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
P=11    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000

LARGEST DROP RADIUS (MICRONS)
P= 3    0.2079d    0.26400    0.36252    0.50979    0.43540    0.20596
P= 4    0.2079d    0.34417    0.41013    0.41269    0.29777    0.20593
P= 5    0.2079d    0.37698    0.42496    0.38796    0.27621    0.20592
P= 6    0.2079d    0.38668    0.42866    0.38028    0.27064    0.20592
P= 7    0.2079d    0.38958    0.42935    0.37765    0.26895    0.20592
P= 8    0.2079d    0.39025    0.42936    0.37669    0.26839    0.20592
P= 9    0.2079d    0.39040    0.42927    0.37632    0.26820    0.20592
P=10    0.2079d    0.39042    0.42920    0.37618    0.26813    0.20592
P=11    0.2079d    0.39042    0.42918    0.37614    0.26811    0.20592

NO. OF ACTIVATED DROPLETS/CC
P= 3    0.0        0.0      100.00000  100.00000  100.00000    0.0
P= 4    0.0        0.0      100.00000  100.00000    0.0        0.0
P= 5    0.0      100.00000  100.00000  100.00000    0.0        0.0
P= 6    0.0      100.00000  100.00000  100.00000    0.0        0.0
P= 7    0.0      100.00000  100.00000  100.00000    0.0        0.0
P= 8    0.0      100.00000  100.00000  100.00000    0.0        0.0
P= 9    0.0      100.00000  100.00000  100.00000    0.0        0.0
```

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
 I=10          100.00000 100.00000 100.00000   0.0         0.0
 I=11    0     100.00000 100.00000 100.00000   0.0         0.0
```


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
TIME=    (   ) SEC
P=1000.28 MB

TEMPERATURE (DEG C)
M= 3   22.00000   21.20066   21.57533   20.77630   18.80232   18.00159
M= 4   22.00000   21.31581   20.80442   20.00477   18.91442   18.00174
M= 5   22.00000   21.27091   20.55740   19.75752   18.87115   18.00162
M= 6   22.00000   21.23694   20.46756   19.66761   18.83704   18.00153
M= 7   22.00000   21.21965   20.43206   19.63286   18.81990   18.00149
M= 8   22.00000   21.21230   20.41915   19.61920   18.81233   18.00147
M= 9   22.00000   21.20920   20.41386   19.61387   18.80922   18.00147
M=10   22.00000   21.20803   20.41190   19.61191   18.80805   18.00146
M=11   22.00000   21.20774   20.41142   19.61143   18.80776   18.00146

SUPERSATURATION (PERCENT)
M= 3    0.00110    0.39394   -6.40771   -6.43876    0.42356    0.00223
M= 4    0.00110   -0.30281   -1.86760   -1.86506   -0.27748    0.00082
M= 5    0.00110   -0.04077   -0.36103   -0.34616   -0.00620    0.00134
M= 6    0.00110    0.16760    0.19328    0.21280    0.20799    0.00173
M= 7    0.00110    0.27264    0.40835    0.42966    0.31577    0.00192
M= 8    0.00110    0.31907    0.49919    0.51518    0.36337    0.00201
M= 9    0.00110    0.33819    0.52629    0.54855    0.38295    0.00204
M=10    0.00110    0.34539    0.53846    0.56081    0.39033    0.00205
M=11    0.00110    0.34719    0.54144    0.56382    0.39216    0.00206

LIQUID MIXING RATIO (GM/KG)
M= 3    0.00000    0.00002    0.00000    0.00000    0.00007    0.00000
M= 4    0.00000    0.00001    0.00000    0.00000    0.00001    0.00000
M= 5    0.00000    0.00002    0.00003    0.00002    0.00001    0.00000
M= 6    0.00000    0.00003    0.00007    0.00005    0.00001    0.00000
M= 7    0.00000    0.00004    0.00008    0.00006    0.00002    0.00000
M= 8    0.00000    0.00004    0.00009    0.00007    0.00002    0.00000
M= 9    0.00000    0.00004    0.00009    0.00007    0.00002    0.00000
M=10    0.00000    0.00004    0.00009    0.00007    0.00002    0.00000
M=11    0.00000    0.00004    0.00009    0.00007    0.00002    0.00000

LARGEST DROP RADIUS (MICRONS)
M= 3    0.20818    0.38116    0.08593    0.08582    0.56766    0.20602
M= 4    0.20818    0.27341    0.12226    0.11917    0.25110    0.20594
M= 5    0.20818    0.39220    0.42903    0.39120    0.29967    0.20597
M= 6    0.20818    0.45566    0.57068    0.51633    0.34018    0.20599
M= 7    0.20818    0.48120    0.61509    0.55700    0.35890    0.20600
M= 8    0.20818    0.49066    0.63001    0.57064    0.36628    0.20600
M= 9    0.20818    0.49396    0.63494    0.57519    0.36897    0.20600
M=10    0.20818    0.49503    0.63649    0.57663    0.36987    0.20600
M=11    0.20818    0.49527    0.63684    0.57695    0.37008    0.20600

NO. OF ACTIVATED DROPLETS/CC
M= 3    0.0      100.00000    0.0        0.0      100.00000    0.0
M= 4    0.0        0.0        0.0        0.0        0.0        0.0
M= 5    0.0      100.00000  100.00000  100.00000    0.0        0.0
M= 6    0.0      100.00000  100.00000  100.00000    0.0        0.0
M= 7    0.0      100.00000  100.00000  100.00000  100.00000    0.0
M= 8    0.0      100.00000  100.00000  100.00000  100.00000    0.0
M= 9    0.0      100.00000  100.00000  100.00000  100.00000    0.0
```

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
I=10   100.00000 100.00000 100.00000 100.00000   0.0
I=11   100.00000 100.00000 100.00000 100.00000   0.0
```

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

TIME= 0 SEC
P=1000.45 MB

TEMPERATURE (DEG C)

M= 3	22.00000	21.20070	22.30122	21.50284	18.80275	18.00151
M= 4	22.00000	21.41470	21.10722	20.30781	19.01565	18.00188
M= 5	22.00000	21.34164	20.70080	19.90104	18.94242	18.00173
M= 6	22.00000	21.27714	20.53876	19.73886	18.87734	18.00160
M= 7	22.00000	21.24089	20.46845	19.66850	18.84099	18.00153
M= 8	22.00000	21.22230	20.43676	19.63678	18.82265	18.00149
M= 9	22.00000	21.21427	20.42243	19.62244	18.81429	18.00148
M=10	22.00000	21.21059	20.41637	19.61638	18.81061	18.00147
M=11	22.00000	21.20939	20.41474	19.61474	18.80961	18.00147

SUPERSATURATION (PERCENT)

M= 3	0.00037	0.40067	-10.45926	-10.52201	0.42084	0.00164
M= 4	0.00037	-0.91256	-3.67222	-3.68492	-0.90489	-0.00088
M= 5	0.00037	-0.47129	-1.23184	-1.22431	-0.44801	-0.00001
M= 6	0.00037	-0.07522	-0.23560	-0.22358	-0.04078	0.00074
M= 7	0.00037	0.14731	0.19436	0.21413	0.18742	0.00116
M= 8	0.00037	0.25811	0.39068	0.41214	0.30145	0.00136
M= 9	0.00037	0.31059	0.47555	0.50177	0.35530	0.00146
M=10	0.00037	0.33315	0.51713	0.53968	0.37849	0.00150
M=11	0.00037	0.33953	0.52727	0.54991	0.38478	0.00151

LIQUID MIXING RATIO (GM/KG)

M= 3	0.00000	0.00005	0.00000	0.00000	0.00013	0.00000
M= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 6	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 7	0.00000	0.00005	0.00012	0.00010	0.00002	0.00000
M= 8	0.00000	0.00006	0.00018	0.00014	0.00003	0.00000
M= 9	0.00000	0.00007	0.00021	0.00017	0.00004	0.00000
M=10	0.00000	0.00008	0.00022	0.00018	0.00004	0.00000
M=11	0.00000	0.00008	0.00022	0.00018	0.00004	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 3	0.20811	0.51406	0.07311	0.07298	0.70836	0.20596
M= 4	0.20811	0.14015	0.09964	0.09952	0.14034	0.20577
M= 5	0.20811	0.16173	0.13184	0.13193	0.16235	0.20583
M= 6	0.20811	0.36294	0.45673	0.40846	0.27329	0.20589
M= 7	0.20811	0.50184	0.70109	0.64702	0.38881	0.20592
M= 8	0.20811	0.56231	0.79327	0.73772	0.44357	0.20593
M= 9	0.20811	0.58771	0.83022	0.77422	0.46733	0.20594
M=10	0.20811	0.59836	0.84454	0.78839	0.47686	0.20594
M=11	0.20811	0.60068	0.84821	0.79204	0.47933	0.20594

NO. OF ACTIVATED DROPLETS/CC

M= 3	0.0	100.00000	0.0	0.0	100.00000	0.0
M= 4	0.0	0.0	0.0	0.0	0.0	0.0
M= 5	0.0	0.0	0.0	0.0	0.0	0.0
M= 6	0.0	100.00000	100.00000	100.00000	0.0	0.0
M= 7	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 8	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 9	0.0	100.00000	100.00000	100.00000	100.00000	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
N=10    0       100.00000 100.00000 100.00000 100.00000   0.0
N=11    0       100.00000 100.00000 100.00000 100.00000   0.0
```


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
TIME=        0 SEC
P=1000.42 MB

TEMPERATURE (DEG C)
M= 3   22.00000   21.20077   22.30094   21.50276   18.80223   18.00140
M= 4   22.00000   21.43470   21.14147   20.34210   19.03563   18.00185
M= 5   22.00000   21.36041   20.75167   19.93195   18.96090   18.00173
M= 6   22.00000   21.28967   20.55968   19.75981   18.88992   18.00161
M= 7   22.00000   21.24812   20.48065   19.68071   18.84824   18.00153
M= 8   22.00000   21.22631   20.44285   19.64292   18.82637   18.00149
M= 9   22.00000   21.21548   20.42485   19.62486   18.81552   18.00147
M=10   22.00000   21.21052   20.41686   19.61687   18.81064   18.00147
M=11   22.00000   21.20925   20.41465   19.61465   18.80928   18.00146

SUPERSATURATION (PERCENT)
M= 3  -0.00017   0.33841  -10.46013  -10.52564   0.41954   0.00081
M= 4  -0.00017  -1.03638   -3.87815   -3.89326  -1.03225  -0.00180
M= 5  -0.00017  -0.56608   -1.42347   -1.41794  -0.56635  -0.00096
M= 6  -0.00017  -0.15450   -0.37235   -0.35769  -0.12262  -0.00015
M= 7  -0.00017   0.09994    0.11484    0.13375   0.13879   0.00032
M= 8  -0.00017   0.23382    0.34852    0.36949   0.27625   0.00057
M= 9  -0.00017   0.30032    0.46034    0.48229   0.34451   0.00070
M=10  -0.00017   0.33022    0.50988    0.53226   0.37521   0.00075
M=11  -0.00017   0.33859    0.52361    0.54611   0.38376   0.00077

LIQUID MIXING RATIO (GM/KG)
M= 3   0.00000   0.00010   0.00000   0.00000   0.00022   0.00000
M= 4   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000
M= 5   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000
M= 6   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000
M= 7   0.00000   0.00004   0.00013   0.00010   0.00002   0.00000
M= 8   0.00000   0.00008   0.00028   0.00023   0.00004   0.00000
M= 9   0.00000   0.00011   0.00037   0.00031   0.00006   0.00000
M=10   0.00000   0.00013   0.00041   0.00035   0.00007   0.00000
M=11   0.00000   0.00013   0.00042   0.00036   0.00007   0.00000

LARGEST DROP RADIUS (MICRONS)
M= 3   0.20798   0.65513   0.07252   0.07239   0.85059   0.20583
M= 4   0.20798   0.13631   0.09704   0.09691   0.13612   0.20560
M= 5   0.20798   0.15265   0.12620   0.12623   0.15336   0.20567
M= 6   0.20798   0.19114   0.16957   0.16728   0.18932   0.20574
M= 7   0.20798   0.46317   0.70326   0.65436   0.36316   0.20578
M= 8   0.20798   0.61109   0.91660   0.86595   0.49815   0.20581
M= 9   0.20798   0.67532   1.00424   0.95295   0.55510   0.20582
M=10   0.20798   0.70180   1.03969   0.98816   0.58447   0.20582
M=11   0.20798   0.70956   1.04908   0.99749   0.59126   0.20582

NO. OF ACTIVATED DROPLETS/CC
M= 3   0.0     100.00000   0.0       0.0     100.00000   0.0
M= 4   0.0       0.0       0.0       0.0       0.0       0.0
M= 5   0.0       0.0       0.0       0.0       0.0       0.0
M= 6   0.0       0.0       0.0       0.0       0.0       0.0
M= 7   0.0     100.00000 100.00000 100.00000 100.00000   0.0
M= 8   0.0     100.00000 100.00000 100.00000 100.00000   0.0
M= 9   0.0     100.00000 100.00000 100.00000 100.00000   0.0
```

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
I=10    0    100.00000 100.00000 100.00000 100.00000   0.0
I=11    0    100.00000 100.00000 100.00000 100.00000   0.0
```


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

TIME= ( ) SEC
P=1000.33 MB

TEMPERATURE (DEG C)

M= 3	22.00000	21.20082	21.57503	20.77620	18.80132	18.00131
M= 4	22.00000	21.36575	20.89350	20.09592	18.96632	18.00167
M= 5	22.00000	21.31849	20.63713	19.83734	18.91681	18.00163
M= 6	22.00000	21.26893	20.52101	19.72112	18.86913	18.00156
M= 7	22.00000	21.23800	20.46353	19.66359	18.83811	18.00151
M= 8	22.00000	21.22083	20.43418	19.63421	18.82089	18.00148
M= 9	22.00000	21.21167	20.41935	19.61936	18.81190	18.00147
M=10	22.00000	21.20768	20.41249	19.61250	18.80770	18.00146
M=11	22.00000	21.20649	20.41055	19.61055	18.80650	18.00146

SUPERSATURATION (PERCENT)

M= 3	-0.00033	0.37261	-6.40510	-6.44123	0.42336	0.00009
M= 4	-0.00033	-0.62068	-2.40569	-2.40912	-0.60500	-0.00166
M= 5	-0.00033	-0.83350	-0.85211	-0.84205	-0.30737	-0.00115
M= 6	-0.00033	-0.03066	-0.13935	-0.12294	0.00354	-0.00059
M= 7	-0.00033	0.15871	0.21555	0.23513	0.19872	-0.00023
M= 8	-0.00033	0.28412	0.39727	0.41848	0.30658	-0.00004
M= 9	-0.00033	0.31914	0.48919	0.51123	0.36349	0.00007
M=10	-0.00033	0.34487	0.53167	0.55409	0.38992	0.00011
M=11	-0.00033	0.35220	0.54373	0.56625	0.39745	0.00013

LIQUID MIXING RATIO (GM/KG)

M= 3	0.00000	0.00019	0.00000	0.00000	0.00035	0.00000
M= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 7	0.00000	0.00003	0.00013	0.00011	0.00001	0.00000
M= 8	0.00000	0.00011	0.00041	0.00035	0.00006	0.00000
M= 9	0.00000	0.00017	0.00059	0.00052	0.00010	0.00000
M=10	0.00000	0.00019	0.00068	0.00060	0.00012	0.00000
M=11	0.00000	0.00020	0.00070	0.00062	0.00013	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 3	0.20735	0.75882	0.08288	0.08274	0.99271	0.20570
M= 4	0.20735	0.15049	0.10869	0.10858	0.15044	0.20552
M= 5	0.20735	0.13554	0.13996	0.14017	0.16633	0.20557
M= 6	0.20735	0.19570	0.18013	0.18121	0.19891	0.20563
M= 7	0.20735	0.41924	0.70720	0.66379	0.33715	0.20566
M= 8	0.20735	0.63437	1.04014	0.99461	0.55770	0.20568
M= 9	0.20735	0.76916	1.17572	1.12924	0.65833	0.20569
M=10	0.20735	0.81272	1.23141	1.18455	0.70050	0.20570
M=11	0.20735	0.82444	1.24635	1.19938	0.71188	0.20570

NO. OF ACTIVATED DROPLETS/CC

M= 3	0.0	100.00000	0.0	0.0	100.00000	0.0
M= 4	0.0	0.0	0.0	0.0	0.0	0.0
M= 5	0.0	0.0	0.0	0.0	0.0	0.0
M= 6	0.0	0.0	0.0	0.0	0.0	0.0
M= 7	0.0	100.00000	100.00000	100.00000	0.0	0.0
M= 8	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 9	0.0	100.00000	100.00000	100.00000	100.00000	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
J=10      100.03000 100.03000 100.00000 100.00000    0.0
J=11      100.03000 100.03000 100.00000 100.00000    0.0
```


Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

TIME= 1[illegible] SEC
P=1000.17 MB

TEMPERATURE (DEG C)

M= 3	22.00000	21.20002	20.41130	19.60074	18.80048	18.00128
M= 4	22.00000	21.20425	20.45812	19.65815	18.83425	18.00142
M= 5	22.00000	21.20415	20.45329	19.65335	18.83224	18.00146
M= 6	22.00000	21.20282	20.43745	19.63753	18.82290	18.00147
M= 7	22.00000	21.21437	20.42358	19.62361	18.81442	18.00146
M= 8	22.00000	21.20843	20.41390	19.61391	18.80845	18.00146
M= 9	22.00000	21.20477	20.40797	19.60797	18.80478	18.00145
M=10	22.00000	21.20287	20.40488	19.60488	18.80287	18.00145
M=11	22.00000	21.20229	20.40395	19.60395	18.80229	18.00145

SUPERSATURATION (PERCENT)

M= 3	-0.00116	0.38660	0.60236	0.62415	0.43068	-0.00026
M= 4	-0.00116	0.18033	0.24656	0.26552	0.21987	-0.00056
M= 5	-0.00116	0.19277	0.27592	0.29554	0.23300	-0.00051
M= 6	-0.00116	0.24938	0.37354	0.39423	0.29187	-0.00040
M= 7	-0.00116	0.30169	0.45558	0.48114	0.34521	-0.00030
M= 8	-0.00116	0.33813	0.51949	0.54164	0.38270	-0.00023
M= 9	-0.00116	0.36054	0.55620	0.57869	0.40574	-0.00018
M=10	-0.00116	0.37221	0.57529	0.59796	0.41774	-0.00016
M=11	-0.00116	0.37572	0.58103	0.60376	0.42135	-0.00015

LIQUID MIXING RATIO (GM/KG)

M= 3	0.00000	0.00030	0.00000	0.00000	0.00052	0.00000
M= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 6	0.00000	0.00001	0.00001	0.00001	0.00001	0.00000
M= 7	0.00000	0.00003	0.00019	0.00016	0.00002	0.00000
M= 8	0.00000	0.00015	0.00063	0.00056	0.00010	0.00000
M= 9	0.00000	0.00025	0.00091	0.00083	0.00017	0.00000
M=10	0.00000	0.00030	0.00106	0.00096	0.00021	0.00000
M=11	0.00000	0.00031	0.00110	0.00100	0.00022	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 3	0.20777	0.94067	0.18715	0.18653	1.13467	0.20562
M= 4	0.20777	0.21031	0.18704	0.18721	0.21146	0.20554
M= 5	0.20777	0.21047	0.21104	0.21197	0.22052	0.20556
M= 6	0.20777	0.24512	0.25491	0.25766	0.25105	0.20559
M= 7	0.20777	0.43088	0.80496	0.76640	0.37250	0.20560
M= 8	0.20777	0.75127	1.20142	1.16059	0.65045	0.20561
M= 9	0.20777	0.88239	1.36245	1.32040	0.77145	0.20562
M=10	0.20777	0.93701	1.42946	1.38689	0.83066	0.20562
M=11	0.20777	0.95180	1.44760	1.40489	0.84507	0.20562

NO. OF ACTIVATED DROPLETS/CC

M= 3	0.0	100.00000	0.0	0.0	100.00000	0.0
M= 4	0.0	0.0	0.0	0.0	0.0	0.0
M= 5	0.0	0.0	0.0	0.0	0.0	0.0
M= 6	0.0	0.0	0.0	0.0	0.0	0.0
M= 7	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 8	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 9	0.0	100.00000	100.00000	100.00000	100.00000	0.0

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
P=10          100.00000 100.00000 100.00000 100.00000   0.0
P=11    0     100.00000 100.00000 100.00000 100.00000   0.0

 - - END OF SIMULATION - -
```

Figure 3-51. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 1 (Cont)

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
SDL2D EX
   1.          .03
 N VS SC
         1
 100.          .002
  TEST 2
   1.               6
   2.              11
   0.        10.          .0625    1.
   5.          .4       -.4
  20.      1000.
STOP SIM
```

Figure 3-52. Input Card Images of the Two-Dimensional Static Diffusion Liquid Experiment Run - Example 2

```
TWO-DIMENSIONAL STATIC DIFFUSION LIQUID EXPERIMENT SIMULATION - TEST 2
CHAMBER GRID SPACING                    1.000 CM
RADIUS OF MODELLED REGION               2.000 CM
INITIAL CHAMBER TEMPERATURE            20.000 DEG C
INITIAL CHAMBER PRESSURE             1000.000 MB
DURATION OF PLATE TEMP CHANGE           5.000 SEC
TOP PLATE TEMP RAMP RATE                0.400 DEG/SEC
BOTTOM PLATE TEMP RAMP RATE            -0.400 DEG/SEC
TIME AT START OF EXPERIMENT             0.0   SEC
DURATION OF EXPERIMENT                 10.000 SEC
TIME STEP                               0.063 SEC
OUTPUT TIME INCREMENT                   1.000 SEC

AEROSOL/DROPLET PARAMETERS

 THERMAL ACCOM. COEFFICIENT IS  1.000
 CONDENSATION COEFFICIENT IS    0.030

 AEROSOL DISTRIBUTION IS        N VS SC

CLASS        NUMBER       CRITICAL      CRITICAL      INITIAL
  NO.  CONCENTRATION      SUPERSAT        RADIUS       RADIUS
            (NO/CC)      (PERCENT)     (MICRONS)    (MICRONS)
    1        100.00        0.20000       0.35829      0.20686
```

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2

TIME= [illegible] SEC
P=1000.00 MB

TEMPERATURE (DEG C)

M= 1	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 2	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 3	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 4	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 5	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 6	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 7	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 8	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M= 9	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M=10	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012
M=11	20.40000	20.21030	20.06542	19.93543	19.79034	19.60012

SUPERSATURATION (PERCENT)

M= 1	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 2	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 3	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 4	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 5	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 6	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 7	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 8	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M= 9	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M=10	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001
M=11	0.00037	0.10766	0.03660	-0.01860	-0.09308	0.00001

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M=10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M=11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 2	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 3	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 4	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 5	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 6	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 7	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 8	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M= 9	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M=10	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670
M=11	0.20733	0.22598	0.21305	0.20279	0.19379	0.20670

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

NO. OF [redacted]VATED DROPLETS/CC

I= 1	C	0.0	0.0	0.0	0.0	0.0
I= 2	0.0	0.0	0.0	0.0	0.0	0.0
I= 3	0.0	0.0	0.0	0.0	0.0	0.0
I= 4	0.0	0.0	0.0	0.0	0.0	0.0
I= 5	0.0	0.0	0.0	0.0	0.0	0.0
I= 6	0.0	0.0	0.0	0.0	0.0	0.0
I= 7	0.0	0.0	0.0	0.0	0.0	0.0
M= 8	0.0	0.0	0.0	0.0	0.0	0.0
I= 9	0.0	0.0	0.0	0.0	0.0	0.0
I=10	0.0	0.0	0.0	0.0	0.0	0.0
I=11	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= [illegible] SEC
P=1000.02 MB

TEMPERATURE (DEG C)

M= 1	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 2	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 3	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 4	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 5	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 6	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 7	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 8	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M= 9	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M=10	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035
M=11	20.80000	20.45100	20.14642	19.85646	19.55107	19.20035

SUPERSATURATION (PERCENT)

M= 1	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 2	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 3	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 4	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 5	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 6	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 7	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 8	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M= 9	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M=10	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011
M=11	0.00015	0.14049	0.08412	0.02954	-0.05879	0.00011

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 3	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 6	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 7	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 8	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M= 9	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M=10	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
M=11	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 2	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 3	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 4	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 5	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 6	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 7	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 8	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M= 9	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M=10	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649
M=11	0.20726	0.23614	0.22174	0.20920	0.19743	0.20649

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

NO. OF [illegible]VATED DROPLETS/CC

M= 1	( )	0.0	0.0	0.0	0.0	0.0
M= 2	0.0	0.0	0.0	0.0	0.0	0.0
M= 3	0.0	0.0	0.0	0.0	0.0	0.0
M= 4	0.0	0.0	0.0	0.0	0.0	0.0
M= 5	0.0	0.0	0.0	0.0	0.0	0.0
M= 6	0.0	0.0	0.0	0.0	0.0	0.0
M= 7	0.0	0.0	0.0	0.0	0.0	0.0
M= 8	0.0	0.0	0.0	0.0	0.0	0.0
M= 9	0.0	0.0	0.0	0.0	0.0	0.0
M=10	0.0	0.0	0.0	0.0	0.0	0.0
M=11	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= 10 SEC
P=1010.05 MB

TEMPERATURE (DEG C)

M= 1	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 2	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 3	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 4	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 5	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 6	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 7	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 8	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M= 9	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M=10	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070
M=11	21.20000	20.69195	20.22778	19.77782	19.31203	18.80070

SUPERSATURATION (PERCENT)

M= 1	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 2	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 3	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 4	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 5	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 6	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 7	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 8	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M= 9	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M=10	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032
M=11	0.00024	0.20304	0.17795	0.12579	0.00891	0.00032

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 2	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 3	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 4	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 5	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 6	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 7	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 8	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M= 9	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M=10	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000
M=11	0.00000	0.00001	0.00001	0.00000	0.00000	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 2	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 3	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 4	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 5	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 6	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 7	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 8	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M= 9	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M=10	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629
M=11	0.20750	0.25002	0.24466	0.22763	0.20715	0.20629

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

NO. OF [redacted]IVATED DROPLETS/CC

M= 1		0.0	0.0	0.0	0.0	0.0
M= 2	0.0	0.0	0.0	0.0	0.0	0.0
M= 3	0.0	0.0	0.0	0.0	0.0	0.0
M= 4	0.0	0.0	0.0	0.0	0.0	0.0
M= 5	0.0	0.0	0.0	0.0	0.0	0.0
M= 6	0.0	0.0	0.0	0.0	0.0	0.0
M= 7	0.0	0.0	0.0	0.0	0.0	0.0
M= 8	0.0	0.0	0.0	0.0	0.0	0.0
M= 9	0.0	0.0	0.0	0.0	0.0	0.0
M=10	0.0	0.0	0.0	0.0	0.0	0.0
M=11	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

```
TIME=      ) SEC
P=1000.08 MB

TEMPERATURE (DEG C)
P= 1  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 2  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 3  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 4  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 5  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 6  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 7  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 8  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P= 9  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P=10  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116
P=11  21.60000  20.93312  20.30945  19.69949  19.07321  18.40116

SUPERSATURATION (PERCENT)
P= 1  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 2  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 3  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 4  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 5  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 6  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 7  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 8  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P= 9  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P=10  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067
P=11  0.00033  0.29688  0.31849  0.27158  0.11170  0.00067

LIQUID MIXING RATIO (GM/KG)
P= 1  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 2  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 3  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 4  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 5  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 6  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 7  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 8  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P= 9  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P=10  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000
P=11  0.00000  0.00001  0.00001  0.00001  0.00000  0.00000

LARGEST DROP RADIUS (MICRONS)
P= 1  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 2  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 3  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 4  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 5  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 6  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 7  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 8  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P= 9  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P=10  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
P=11  0.20774  0.29686  0.29952  0.27091  0.22688  0.20610
```

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

AC. OF VALID DROPLETS/CC

M= 1	0	0.0	0.0	0.0	0.0	0.0
M= 2	0.0	0.0	0.0	0.0	0.0	0.0
M= 3	0.0	0.0	0.0	0.0	0.0	0.0
M= 4	0.0	0.0	0.0	0.0	0.0	0.0
M= 5	0.0	0.0	0.0	0.0	0.0	0.0
M= 6	0.0	0.0	0.0	0.0	0.0	0.0
M= 7	0.0	0.0	0.0	0.0	0.0	0.0
M= 8	0.0	0.0	0.0	0.0	0.0	0.0
M= 9	0.0	0.0	0.0	0.0	0.0	0.0
M=10	0.0	0.0	0.0	0.0	0.0	0.0
M=11	0.0	0.0	0.0	0.0	0.0	0.0

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= [illegible] SEC
P=1000.13 MB

TEMPERATURE (DEG C)

M= 1	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 2	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 3	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 4	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 5	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 6	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 7	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 8	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M= 9	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M=10	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173
M=11	22.00000	21.17450	20.39142	19.62147	18.83459	18.00173

SUPERSATURATION (PERCENT)

M= 1	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 2	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 3	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 4	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 5	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 6	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 7	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 8	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M= 9	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M=10	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123
M=11	0.00043	0.41501	0.50523	0.46751	0.25082	0.00123

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 2	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 3	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 4	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 5	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 6	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 7	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 8	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M= 9	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M=10	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000
M=11	0.00000	0.00002	0.00003	0.00002	0.00001	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 2	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 3	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 4	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 5	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 6	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 7	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 8	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M= 9	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M=10	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592
M=11	0.20798	0.39031	0.42899	0.37596	0.26804	0.20592

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

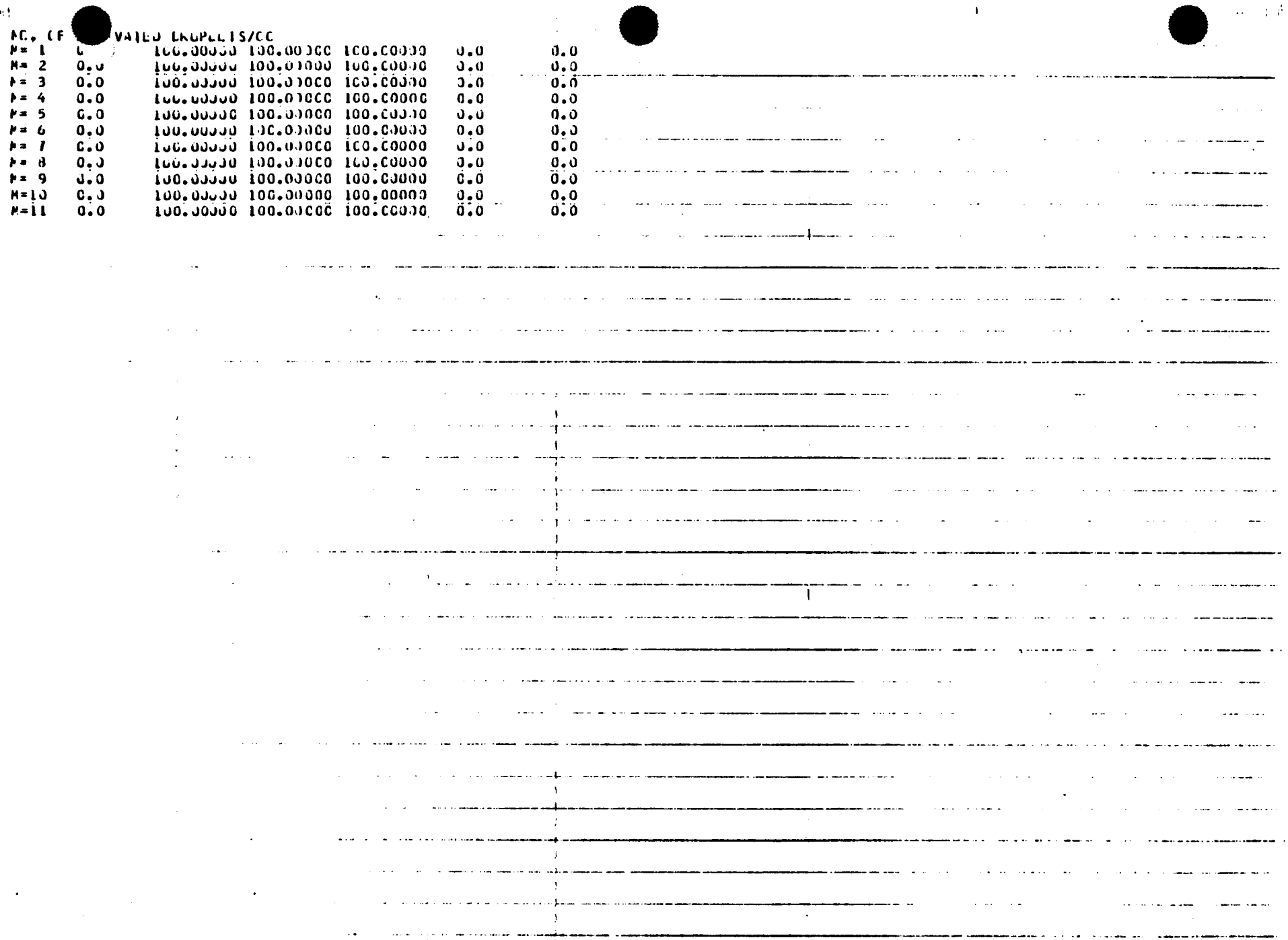


Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= [illegible] SEC
P=1000.14 MB

TEMPERATURE (DEG C)

M= 1	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 2	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 3	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 4	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 5	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 6	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 7	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 8	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M= 9	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M=10	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145
M=11	22.00000	21.20300	20.40436	19.60437	18.80301	18.00145

SUPERSATURATION (PERCENT)

M= 1	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 2	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 3	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 4	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 5	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 6	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 7	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 8	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M= 9	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M=10	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105
M=11	0.00035	0.37177	0.57831	0.60082	0.41699	0.00105

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 2	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 3	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 4	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 5	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 6	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 7	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 8	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M= 9	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M=10	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000
M=11	0.00000	0.00005	0.00010	0.00007	0.00002	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 2	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 3	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 4	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 5	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 6	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 7	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 8	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M= 9	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M=10	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583
M=11	0.20799	0.50294	0.64663	0.58667	0.37700	0.20583

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

```
NO. OF      IVATED DROPLETS/CC
M= 1        100.00000 100.00000 100.00000 100.00000   0.0
M= 2   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 3   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 4   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 5   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 6   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 7   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 8   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M= 9   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M=10   0.0  100.00000 100.00000 100.00000 100.00000   0.0
M=11   0.0  100.00000 100.00000 100.00000 100.00000   0.0
```


Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= ( ) SEC
P=1000.14 MB

TEMPERATURE (DEG C)

P= 1	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 2	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 3	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 4	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 5	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 6	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 7	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 8	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P= 9	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P=10	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145
P=11	22.00000	21.20273	20.40392	19.60392	18.80272	18.00145

SUPERSATURATION (PERCENT)

P= 1	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 2	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 3	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 4	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 5	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 6	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 7	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 8	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P= 9	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P=10	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106
P=11	0.00035	0.37610	0.58894	0.61195	0.42424	0.00106

LIQUID MIXING RATIO (GM/KG)

P= 1	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 2	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 3	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 4	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 5	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 6	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 7	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 8	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P= 9	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P=10	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000
P=11	0.00000	0.00009	0.00025	0.00020	0.00005	0.00000

LARGEST DROP RADIUS (MICRONS)

P= 1	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 2	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 3	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 4	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 5	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 6	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 7	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 8	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P= 9	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P=10	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582
P=11	0.20798	0.62816	0.88327	0.82691	0.50479	0.20582

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

AC. OF	VATED DROPLETS/CC				
M= 1	0.	100.00000	100.00000	100.00000	100.00000	0.0
M= 2	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 3	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 4	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 5	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 6	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 7	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 8	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M= 9	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M=10	0.0	100.00000	100.00000	100.00000	100.00000	0.0
M=11	0.0	100.00000	100.00000	100.00000	100.00000	0.0

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= [illegible] SEC
P=1000.1, MB

TEMPERATURE (DEG C)

M= 1	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 2	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 3	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 4	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 5	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 6	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 7	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 8	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M= 9	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M=10	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145
M=11	22.00000	21.20274	20.40395	19.60395	18.80273	18.00145

SUPERSATURATION (PERCENT)

M= 1	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 2	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 3	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 4	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 5	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 6	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 7	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 8	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M= 9	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M=10	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106
M=11	0.00035	0.37036	0.58932	0.61236	0.42455	0.00106

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 2	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 3	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 4	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 5	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 6	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 7	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 8	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M= 9	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M=10	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000
M=11	0.00000	0.00016	0.00050	0.00043	0.00009	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 2	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 3	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 4	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 5	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 6	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 7	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 8	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M= 9	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M=10	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582
M=11	0.20798	0.76065	1.11361	1.06168	0.64040	0.20582

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

NO. OF	[illegible]VATED DROPLETS/CC				
P= 1	[illegible]	100.00000	100.00000	100.00000	100.00000	0.0
P= 2	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 3	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 4	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 5	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 6	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 7	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 8	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P= 9	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P=10	0.0	100.00000	100.00000	100.00000	100.00000	0.0
P=11	0.0	100.00000	100.00000	100.00000	100.00000	0.0

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

```
TIME=      ) SEC
P=1000.14 MB

TEMPERATURE (DEG C)
M= 1   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 2   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 3   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 4   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 5   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 6   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 7   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 8   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M= 9   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M=10   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145
M=11   22.00000   21.20280   20.40405   19.60405   18.80279   18.00145

SUPERSATURATION (PERCENT)
M= 1    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 2    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 3    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 4    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 5    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 6    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 7    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 8    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M= 9    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M=10    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106
M=11    0.00005   0.37792   0.58854   0.61157   0.42409   0.00106

LIQUID MIXING RATIO (GM/KG)
M= 1    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 2    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 3    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 4    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 5    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 6    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 7    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 8    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M= 9    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M=10    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000
M=11    0.00000   0.00026   0.00086   0.00077   0.00017   0.00000

LARGEST DROP RADIUS (MICRONS)
M= 1    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 2    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 3    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 4    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 5    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 6    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 7    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 8    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M= 9    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M=10    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
M=11    0.20798   0.89577   1.33314   1.28566   0.78051   0.20582
```

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

```
NO. OF                (VATED DROPLETS/CC
M= 1      (           100.00000 100.00000 100.00000 100.00000   0.0
M= 2      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 3      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 4      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 5      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 6      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 7      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 8      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M= 9      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M=10      0.0         100.00000 100.00000 100.00000 100.00000   0.0
M=11      0.0         100.00000 100.00000 100.00000 100.00000   0.0
```

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

TIME= [illegible] SEC
P=1000.14 MB

TEMPERATURE (DEG C)

M= 1	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 2	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 3	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 4	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 5	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 6	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 7	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 8	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M= 9	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M=10	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145
M=11	22.00000	21.20286	20.40417	19.60416	18.80285	18.00145

SUPERSATURATION (PERCENT)

M= 1	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 2	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 3	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 4	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 5	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 6	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 7	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 8	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M= 9	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M=10	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106
M=11	0.00035	0.37738	0.58760	0.61060	0.42352	0.00106

LIQUID MIXING RATIO (GM/KG)

M= 1	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 2	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 3	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 4	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 5	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 6	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 7	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 8	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M= 9	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M=10	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000
M=11	0.00000	0.00040	0.00133	0.00121	0.00028	0.00000

LARGEST DROP RADIUS (MICRONS)

M= 1	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 2	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 3	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 4	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 5	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 6	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 7	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 8	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M= 9	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M=10	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582
M=11	0.20798	1.03096	1.54168	1.49841	0.92191	0.20582

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

```
NC. I.F    (VALID DROPLETS/CC
M= 1    0      100.00000 100.00000 100.00000 100.00000    0.0
M= 2    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 3    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 4    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 5    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 6    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 7    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 8    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M= 9    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M=10    0.0    100.00000 100.00000 100.00000 100.00000    0.0
M=11    0.0    100.00000 100.00000 100.00000 100.00000    0.0

 - - END OF SIMULATION - -
   * END SIMULATION *
```

Figure 3-53. Sample Output of the Two-Dimensional Static Diffusion Liquid Experiment Simulation - Example 2 (Cont)

3.2.8 CFD Fluid Dynamics Module

Great care must be used when working with the three-dimensional fluid dynamics program which simulates the exit flow of a continuous flow diffusion chamber. Since three convergence parameters, TOLW (velocity), TOLphi (velocity potential), and TOLPR (pressure), are used, coupling between convergence levels is in inevitable and regrettable, not very well understood. If all three tolerances are not with some range where convergence occurs, the calculation will diverge and eventually overflow. To lessen the ordeal, it is suggested that the program be run without PLOC, the pressure fluctuation subroutine, in order to find initial values for the values for the convergence parameters. (Such a program already exists and is called TDF.) Once this has been done, the convergence values found using TDF may be fine tuned using TDFI, a program which includes the pressure fluctuation.

Recent results have indicated that the flow field found from TDF is very close (2-3% difference) to that obtained with TDFI. Typical run time on the Prime 400 are 1½ hours for TDF and 2¼ hours for TDFI. Use of TDFI is only necessary if a very good approximation for the flow field is needed.

Both programs use the same data set on channel 5. A typical data set is shown in Figure 1. The function of each input is shown in Figure 2.

If TDF does not reach the desired level of convergence without diverging, increase the chamber length (CLEN) and rerun the program. If the velocities on the wall away from exit port are greater than 1×10^{-L} times the average velocity (WAVE), increase the number of grid points (LW) in the chamber. It may be necessary to change the dimension of the computational arrays since the X, Y, and Z components are dimensioned 21, 21, and 31, respectively. Also one check in subroutine grid must be changed to be consistent with the new dimensions.

Once acceptable levels of convergence and wall velocities are obtained from TDF and it felt running TDFI would be beneficial, the convergence parameters should be fine-tuned trying to achieve convergence from TDFI.

The program outputs are in three sections. First comes iteration data which is output while the program is running, second is a listing of input data, and third is the velocity and pressure fields. The velocity and pressure fields are output on XY plane at a time starting with the first or L=1 plane and continuing past the constriction to the downstream end of the exit port. The values of velocity on the walls are always printed.

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
  1.00          WAVE        F10.4           INITIAL VELOCITY
 1.207E-03      RHO         E10.3           DENSITY
  0.14          VISCK       F10.4           KINEMATIC VISCOSITY
 30.0           CLEN        F10.4           CHAMBER LENGTH
 18.0           CWID        F10.4           CHAMBER WIDTH
  3.0           CHGT        F10.4           CHAMBER HEIGHT
 60.0           XLEN        F10.4           EXIT PORT LENGTH
  9.0           XWID        F10.4           EXIT PORT WIDTH
  1.5           XHGT        F10.4           EXIT PORT HEIGHT
  51            ITWMAX      I4              MAXIMUM NUMBER OF VELOCITY ITERATIONS
 511            ITPMAX      I4              MAXIMUM NUMBER OF PRESSURE ITERATIONS
 1.000E-03      TOLW        E10.3           VELOCITY CONVERGENCE TOLERANCE
 1.000E-03      TOLPHI      E10.3           POTENTIAL CONVERGENCE TOLERANCE
 3.000E-05      TOLPR       E10.3           PRESSURE CONVERGENCE TOLERANCE
  21            NX          I4              NUMBER OF POINTS  X-GRID
  21            MY          I4              NUMBER OF POINTS  Y-GRID
  16            LW          I4              NUMBER OF POINTS  Z-GRID
```

Figure 1. Typical Data Set for the CFD Fluid Dynamics Module

```
LIST OF INPUT PARAMETERS
UAVE      INITIAL VELOCITY
RHO       FLUID DENSITY
VISCK     KINEMATIC VISCOSITY
CLEN      CHAMBER LENGTH
CWID      CHAMBER WIDTH
CHGT      CHAMBER HEIGHT
XLEN      EXIT PORT LENGTH
XWID      EXIT PORT WIDTH
XHGT      EXIT PORT HEIGHT
ITMAX     MAXIMUM NUMBER OF VELOCITY ITERATIONS
ITPMAX    MAXIMUM NUMBER OF VELOCITY ITERATIONS
TOLU      VELOCITY CONVERGENCE CRITERION
TOLPHI    POTENTIAL CONVERGENCE CRITERION
TOLPR     PRESSURE CONVERGENCE CRITERION
NX        NUMBER OF GRID POINTS  X-GRID
NY        NUMBER OF GRID POINTS  Y-GRID
LZ        NUMBER OF GRID POINTS  Z-GRID

ALL PARAMETERS ARE ASSUMED TO BE IN THE CGS SYSTEM OF UNITS.
```

Figure 2. Input Parameter for the CFD Fluid Dynamics Module

3.3 INPUT DECK SETUP

The input deck consists of 1) FORTRAN source programs and sub-programs of the ACPL Simulation System and 2) input data cards. See Section 5 for placement of these decks in the JCL run setup.

3.3.1 FORTRAN Source Deck

The FORTRAN source deck requires modification only when the Adiabatic Expansion Experiment is run with the driving function option PFUNCT. In this case, the user must provide a double precision function named PFUNCT as described in example 5 of Section 3.2.1.1.

3.3.2 Input Data Cards

One complete set of input data cards must be submitted for each experiment run. As many experiments as the user desires may be performed by attaching one data set module for each experiment.

3.3.3 Example of Multiple Experiments Set Up in One Run

In this example, three experiments are performed in the same run. See Figure 3-34 for input and Figure 3-35 for output. The first experiment is an Adiabatic Expansion as denoted by the card ADIA EXP followed by data cards. The second experiment is Non-adiabatic Expansion as denoted by the card NADI EXP, followed by the Non-adiabatic Expansion data cards. The third case is a Static Diffusion Liquid experiment simulation run as denoted by the card SDL EXP. This card is followed by the appropriate input data cards. The STOP SIM terminates the data input for all runs.

```
12345678901234567890123456789012345678901234567890123456789012345678901234567890
ADIA EXP
      1000.                293.15                1.
      1000.                293.15
         0.                 50.                                .005              1.0
         1.                   .03               75.
     6
        25.                   .002
       100.                   .004
       125.                   .006
       125.                   .008
       100                    .009
        25.                   .01
 PVSTIME     5
       1000.                  0.
        880.                 13.
        880.                 60.
        830.                 70.
        500.                100.
NADI EXP
    11     2    1.0
 296.15    1000.
 298.65    1000.                -2.3
     6    1.
  25.                .002
 100.                .004
 125.                .006
 125.                .008
 100.                .009
  25.                .01
   0.           13.              50.              5.
   1.                .03
SDL EXP
     1.                .03
 291.15    1000.
     1    1.
    1.                 .01
    11      0          2
    0.             0.              50              5.
   25.                .04            -.04
STOP SIM
```

Figure 3-34. Data Input Card Setup for 3 Experiments

```
 INPUT PARAMETERS FOR ADIABATIC EXPANSION CHAMBER EXPERIMENT

INITIAL PRESSURE                        0.10000D 04 MB
INITIAL TEMPERATURE                     0.29315D 03 DEG K
INITIAL VOLUME                          0.10000D 01 CC
SATURATOR PRESSURE                      0.10000D 04 MB
SATURATOR TEMPERATURE                   0.29315D 03 DEG K
START TIME                              0.0         SEC
END TIME                                0.50000D 02 SEC
INTEGRATION TIME INCREMENT              0.50000D-02 SEC
PRINT TIME INCREMENT                    0.10000D 01 SEC
THERMAL CONDUCTIVITY COEFF.             0.10000D 01
CONDENSATION COEFFICIENT                0.30000D-01
SURFACE TENSION                         0.75000D 02 DYNES/SQ CM
NUMBER OF PARTICLE CLASSES                 6
     # PART.          CRIT. SUPERSATURATION
   0.25000D 02             0.20000D-02
   0.10000D 03             0.40000D-02
   0.12500D 03             0.60000D-02
   0.12500D 03             0.80000D-02
   0.10000D 03             0.90000D-02
   0.25000D 02             0.10000D-01
OPTION:  PRESSURE VS TIME
      PRESSURE                 TIME
        (MB)                   (SEC)
    0.10000D 04          0.0
    0.88000D 03          0.13000D 02
    0.88000D 03          0.60000D 02
    0.83000D 03          0.70000D 02
    0.50000D 03          0.10000D 03
```

Figure 3-35. Sample Output of the Multiple Experiment Run

DROPLET RADII(CM) TIME HISTORY

TIME(SEC)	R(1)	R(2)	R(3)	R(4)	R(5)	R(6)
1.00	0.11504421E-03	0.10379228E-03	0.97669355E-04	0.92774440E-04	0.90495290E-04	0.88253088E-04
2.00	0.29303064E-03	0.28611650E-03	0.28242846E-03	0.27951761E-03	0.27817418E-03	0.27686125E-03
3.00	0.46223914E-03	0.45717857E-03	0.45449403E-03	0.45238249E-03	0.45141019E-03	0.45046117E-03
4.00	0.59839222E-03	0.59424271E-03	0.59204758E-03	0.59032394E-03	0.58953115E-03	0.58875745E-03
5.00	0.70148334E-03	0.69782673E-03	0.69589424E-03	0.69437805E-03	0.69368072E-03	0.69300062E-03
6.00	0.77991905E-03	0.77656074E-03	0.77478681E-03	0.77339541E-03	0.77275559E-03	0.77213164E-03
7.00	0.84215449E-03	0.83900127E-03	0.83733629E-03	0.83603035E-03	0.83543011E-03	0.83484477E-03
8.00	0.89403824E-03	0.89103752E-03	0.88945357E-03	0.88821165E-03	0.88764375E-03	0.88708382E-03
9.00	0.93885208E-03	0.93597104E-03	0.93445065E-03	0.93325833E-03	0.93271025E-03	0.93217590E-03
10.00	0.97902468E-03	0.97624282E-03	0.97477483E-03	0.97362394E-03	0.97309495E-03	0.97257900E-03
11.00	0.10158084E-02	0.10131111E-02	0.10116880E-02	0.10105723E-02	0.10100596E-02	0.10095597E-02
12.00	0.10499544E-02	0.10473314E-02	0.10459472E-02	0.10448624E-02	0.10443637E-02	0.10438776E-02
13.00	0.10819673E-02	0.10794096E-02	0.10780604E-02	0.10770028E-02	0.10765167E-02	0.10760429E-02
14.00	0.10997558E-02	0.10972333E-02	0.10959024E-02	0.10948593E-02	0.10943799E-02	0.10939126E-02
15.00	0.11045076E-02	0.11019942E-02	0.11006682E-02	0.10996289E-02	0.10991511E-02	0.10986854E-02
16.00	0.11057556E-02	0.11032443E-02	0.11019194E-02	0.11008810E-02	0.11004037E-02	0.10999385E-02
17.00	0.11060848E-02	0.11035737E-02	0.11022491E-02	0.11012109E-02	0.11007339E-02	0.11002687E-02
18.00	0.11061418E-02	0.11036308E-02	0.11023062E-02	0.11012680E-02	0.11007907E-02	0.11003255E-02
19.00	0.11061583E-02	0.11036450E-02	0.11023204E-02	0.11012820E-02	0.11008047E-02	0.11003395E-02
20.00	0.11061612E-02	0.11036496E-02	0.11023248E-02	0.11012864E-02	0.11008091E-02	0.11003439E-02
21.00	0.11061633E-02	0.11036515E-02	0.11023264E-02	0.11012880E-02	0.11008107E-02	0.11003455E-02
22.00	0.11061640E-02	0.11036522E-02	0.11023271E-02	0.11012885E-02	0.11008112E-02	0.11003457E-02
23.00	0.11061647E-02	0.11036524E-02	0.11023274E-02	0.11012885E-02	0.11008112E-02	0.11003457E-02
24.00	0.11061649E-02	0.11036526E-02	0.11023274E-02	0.11012885E-02	0.11008112E-02	0.11003457E-02
25.00	0.11061653E-02	0.11036526E-02	0.11023274E-02	0.11012885E-02	0.11008112E-02	0.11003457E-02
26.00	0.11061658E-02	0.11036529E-02	0.11023274E-02	0.11012885E-02	0.11008109E-02	0.11003455E-02
27.00	0.11061660E-02	0.11036531E-02	0.11023274E-02	0.11012885E-02	0.11008109E-02	0.11003453E-02
28.00	0.11061665E-02	0.11036531E-02	0.11023274E-02	0.11012882E-02	0.11008107E-02	0.11003453E-02
29.00	0.11061667E-02	0.11036533E-02	0.11023274E-02	0.11012882E-02	0.11008107E-02	0.11003450E-02
30.00	0.11061670E-02	0.11036533E-02	0.11023274E-02	0.11012882E-02	0.11008107E-02	0.11003450E-02
31.00	0.11061674E-02	0.11036536E-02	0.11023276E-02	0.11012882E-02	0.11008105E-02	0.11003448E-02
32.00	0.11061677E-02	0.11036536E-02	0.11023276E-02	0.11012880E-02	0.11008105E-02	0.11003446E-02
33.00	0.11061681E-02	0.11036538E-02	0.11023276E-02	0.11012880E-02	0.11008102E-02	0.11003446E-02
34.00	0.11061684E-02	0.11036538E-02	0.11023276E-02	0.11012880E-02	0.11008102E-02	0.11003444E-02
35.00	0.11061688E-02	0.11036540E-02	0.11023276E-02	0.11012878E-02	0.11008100E-02	0.11003444E-02
36.00	0.11061691E-02	0.11036540E-02	0.11023276E-02	0.11012878E-02	0.11008100E-02	0.11003441E-02
37.00	0.11061695E-02	0.11036543E-02	0.11023276E-02	0.11012878E-02	0.11008098E-02	0.11003439E-02
38.00	0.11061698E-02	0.11036543E-02	0.11023276E-02	0.11012875E-02	0.11008098E-02	0.11003439E-02
39.00	0.11061702E-02	0.11036545E-02	0.11023276E-02	0.11012875E-02	0.11008095E-02	0.11003437E-02
40.00	0.11061705E-02	0.11036545E-02	0.11023276E-02	0.11012875E-02	0.11008095E-02	0.11003434E-02
41.00	0.11061709E-02	0.11036547E-02	0.11023276E-02	0.11012875E-02	0.11008093E-02	0.11003434E-02
42.00	0.11061712E-02	0.11036547E-02	0.11023276E-02	0.11012873E-02	0.11008093E-02	0.11003432E-02
43.00	0.11061716E-02	0.11036550E-02	0.11023276E-02	0.11012873E-02	0.11008093E-02	0.11003432E-02
44.00	0.11061719E-02	0.11036550E-02	0.11023276E-02	0.11012873E-02	0.11008091E-02	0.11003430E-02
45.00	0.11061721E-02	0.11036552E-02	0.11023276E-02	0.11012871E-02	0.11008091E-02	0.11003427E-02
46.00	0.11061726E-02	0.11036554E-02	0.11023276E-02	0.11012871E-02	0.11008088E-02	0.11003427E-02
47.00	0.11061728E-02	0.11036554E-02	0.11023278E-02	0.11012871E-02	0.11008088E-02	0.11003425E-02
48.00	0.11061733E-02	0.11036557E-02	0.11023278E-02	0.11012868E-02	0.11008086E-02	0.11003423E-02
49.00	0.11061735E-02	0.11036557E-02	0.11023278E-02	0.11012868E-02	0.11008086E-02	0.11003423E-02
50.00	0.11061740E-02	0.11036559E-02	0.11023278E-02	0.11012868E-02	0.11008084E-02	0.11003420E-02

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

TIME(SEC)	P(MB)	V(CC)	S-1	T(K)
1.00	0.99076904E 03	0.10066652E 01	0.39126024E-01	0.29238062E 03
2.00	0.98153839E 03	0.10136862E 01	0.71780562E-01	0.29169458E 03
3.00	0.97230762E 03	0.10214272E 01	0.84782422E-01	0.29121655E 03
4.00	0.96307690E 03	0.10298243E 01	0.79928935E-01	0.29091724E 03
5.00	0.95384595E 03	0.10385571E 01	0.68584383E-01	0.29067944E 03
6.00	0.94461523E 03	0.10474176E 01	0.58146343E-01	0.29042798E 03
7.00	0.93538452E 03	0.10563469E 01	0.50652459E-01	0.29014185E 03
8.00	0.92615381E 03	0.10653991E 01	0.45879750E-01	0.28982495E 03
9.00	0.91692285E 03	0.10744801E 01	0.42493895E-01	0.28948486E 03
10.00	0.90769214E 03	0.10837345E 01	0.40332530E-01	0.28912964E 03
11.00	0.89846143E 03	0.10931425E 01	0.38780369E-01	0.28876318E 03
12.00	0.88923071E 03	0.11027126E 01	0.37609428E-01	0.28838770E 03
13.00	0.87999976E 03	0.11124563E 01	0.36690071E-01	0.28800464E 03
14.00	0.87999948E 03	0.11193308E 01	0.98709464E-02	0.28827295E 03
15.00	0.87997070E 03	0.11135607E 01	0.26260060E-02	0.28834692E 03
16.00	0.87997070E 03	0.11136217E 01	0.72292099E-03	0.28836646E 03
17.00	0.87997070E 03	0.11136370E 01	0.22113427E-03	0.28837158E 03
18.00	0.87997070E 03	0.11136398E 01	0.13438972E-03	0.28837256E 03
19.00	0.87997070E 03	0.11136408E 01	0.11297983E-03	0.28837256E 03
20.00	0.87997070E 03	0.11136408E 01	0.10610651E-03	0.28837280E 03
21.00	0.87997070E 03	0.11136406E 01	0.10348705E-03	0.28837280E 03
22.00	0.87997070E 03	0.11136408E 01	0.10271184E-03	0.28837280E 03
23.00	0.87997070E 03	0.11136408E 01	0.10243140E-03	0.28837280E 03
24.00	0.87997070E 03	0.11136408E 01	0.10232012E-03	0.28837280E 03
25.00	0.87997070E 03	0.11136406E 01	0.10228160E-03	0.28837280E 03
26.00	0.87997070E 03	0.11136408E 01	0.10226789E-03	0.28837280E 03
27.00	0.87997070E 03	0.11136408E 01	0.10226334E-03	0.28837280E 03
28.00	0.87997070E 03	0.11136408E 01	0.10226163E-03	0.28837280E 03
29.00	0.87997070E 03	0.11136408E 01	0.10226101E-03	0.28837280E 03
30.00	0.87997070E 03	0.11136408E 01	0.10226080E-03	0.28837280E 03
31.00	0.87997070E 03	0.11136408E 01	0.10226073E-03	0.28837280E 03
32.00	0.87997070E 03	0.11136408E 01	0.10226072E-03	0.28837280E 03
33.00	0.87997070E 03	0.11136406E 01	0.10226070E-03	0.28837280E 03
34.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
35.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
36.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
37.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
38.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
39.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
40.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
41.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
42.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
43.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
44.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
45.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
46.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
47.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
48.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
49.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03
50.00	0.87997070E 03	0.11136408E 01	0.10226070E-03	0.28837280E 03

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

TIME(SEC)	NW(GM.MOLE)	NV(GM.MOLE)	NU(GM.MOLE)	MIXING RATIO
1.00	0.10635920E-09	0.95897121E-06	0.41027728E-04	0.18268186E-05
2.00	0.26006695E-08	0.95647738E-06	0.41025240E-04	0.39808219E-04
3.00	0.10871862E-07	0.94820643E-06	0.41016960E-04	0.16631703E-03
4.00	0.24140292E-07	0.93493799E-06	0.41003688E-04	0.36939653E-03
5.00	0.39240632E-07	0.91983765E-06	0.40988598E-04	0.60058616E-03
6.00	0.54148281E-07	0.90493000E-06	0.40973682E-04	0.82890340E-03
7.00	0.68292138E-07	0.89078611E-06	0.40959538E-04	0.10456434E-02
8.00	0.81785799E-07	0.87729245E-06	0.40946048E-04	0.12525136E-02
9.00	0.94833410E-07	0.86424484E-06	0.40932995E-04	0.14528094E-02
10.00	0.10764825E-06	0.85143000E-06	0.40920189E-04	0.16492391E-02
11.00	0.12034690E-06	0.83873135E-06	0.40907486E-04	0.18441565E-02
12.00	0.13299342E-06	0.82606463E-06	0.40894840E-04	0.20383580E-02
13.00	0.14562420E-06	0.81345405E-06	0.40882209E-04	0.22323523E-02
14.00	0.15296450E-06	0.80611380E-06	0.40874875E-04	0.23422558E-02
15.00	0.15490818E-06	0.80411007E-06	0.40872867E-04	0.23757017E-02
16.00	0.15549722E-06	0.80358103E-06	0.40872343E-04	0.23830102E-02
17.00	0.15563688E-06	0.80344197E-06	0.40872197E-04	0.23857490E-02
18.00	0.15566110E-06	0.80341721E-06	0.40872168E-04	0.23865693E-02
19.00	0.15566707E-06	0.80341124E-06	0.40872168E-04	0.23866971E-02
20.00	0.15566894E-06	0.80340931E-06	0.40872168E-04	0.23867057E-02
21.00	0.15566968E-06	0.80340857E-06	0.40872168E-04	0.23867127E-02
22.00	0.15566991E-06	0.80340834E-06	0.40872168E-04	0.23867171E-02
23.00	0.15566997E-06	0.80340828E-06	0.40872168E-04	0.23867189E-02
24.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867174E-02
25.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
26.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
27.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
28.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
29.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
30.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
31.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
32.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
33.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
34.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
35.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
36.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
37.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
38.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
39.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
40.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
41.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
42.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
43.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
44.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
45.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
46.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
47.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
48.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
49.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02
50.00	0.15567002E-06	0.80340823E-06	0.40872168E-04	0.23867176E-02

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

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INPUT PARAMETERS FOR NON-ADIABATIC EXPANSION CHAMBER EXPERIMENT

 SATURATOR TEMPERATURE      296.150 DEG K
 SATURATOR PRESSURE        1000.000 MB
 INITIAL CHAMBER TEMP       298.650 DEG K
 INITIAL CHAMBER PRESSURE  1000.000 MB
 REFERENCE VOLUME             1.000 CC
 EXPANSION RATE              -2.300 MB/SEC
 EXPANSION DURATION          13.000 SEC
 EXPERIMENT DURATION         50.000 SEC
 ACCOMODATION COEFF           1.000
 CONDENSATION COEFF           0.030

 GRID PARAMETERS
      SPHERICAL COORDINATES
      NUMBER OF SPACE POINTS=  11
      GRID SPACING          =  1.00 CM

      INDEX  POSITION          VOLUME          AREA
          1     0.0        0.41667D-01    0.250000 00
          2     1.00000    0.10833D 01    0.225000 01
          3     2.00000    0.40833D 01    0.625000 01
          4     3.00000    0.90833D 01    0.122500 02
          5     4.00000    0.16083D 02    0.202500 02
          6     5.00000    0.25083D 02    0.302500 02
          7     6.00000    0.36083D 02    0.422500 02
          8     7.00000    0.49083D 02    0.562500 02
          9     8.00000    0.64083D 02    0.722500 02
         10     9.00000    0.81083D 02    0.902500 02
         11    10.00000    0.47542D 02

 INTEGRATION TIME INCREMENT =  0.500

 AEROSOL/DROPLET PARAMETERS

 NUMBER OF DROPLET CLASSES=  6

 CLASS    NO/CC      CRIT SSAT    CRIT RADIUS    INIT RADIUS          A            B
    1     25.00        0.00200    0.36277D-04    0.67470D-05    0.10883D-06    0.47742D-16
    2     100.00       0.00400    0.18139D-04    0.41628D-05    0.10883D-06    0.11936D-16
    3     125.00       0.00600    0.12092D-04    0.31230D-05    0.10883D-06    0.53047D-17
    4     125.00       0.00800    0.90693D-05    0.25396D-05    0.10883D-06    0.29839D-17
    5     100.00       0.00900    0.80616D-05    0.23316D-05    0.10883D-06    0.23576D-17
    6     25.00        0.01000    0.72554D-05    0.21592D-05    0.10883D-06    0.19097D-17

 TIME=    9. SEC          PRESSURE= 988.50 MB          TOTAL VOLUME=  936.372 CC

      J      TEMP      VMXRAT      LMXRAT    SUPERSAT ACT DROPS  DROP RAD
           DEG K        G/KG        G/KG      PERCENT     NO/CC    MICRON
      1   297.666   17.98107   0.0000001    -9.77829       0.0   0.07422
      2   297.666   17.98107   0.0000001    -9.77829       0.0   0.07422
      3   297.666   17.98107   0.0000001    -9.77830       0.0   0.07422
      4   297.666   17.98107   0.0000001    -9.77831       0.0   0.07422
      5   297.666   17.98107   0.0000001    -9.77847       0.0   0.07422
      6   297.667   17.98107   0.0000001    -9.78024       0.0   0.07422
      7   297.669   17.98107   0.0000001    -9.79431       0.0   0.07420
      8   297.685   17.98107   0.0000001    -9.87843       0.0   0.07407
      9   297.755   17.98107   0.0000001   -10.25942       0.0   0.07343
     10   298.000   17.98107   0.0000001   -11.56419       0.0   0.07119
     11   298.650   17.98107   0.0000001   -14.92119       0.0   0.06619
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Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

```
 DROP RADIUS SPECTRUM
 J=     1     2     3     4     5     6     7     8     9    10    11
      0.074 0.074 0.074 0.074 0.074 0.074 0.074 0.074 0.073 0.071 0.068
      0.046 0.046 0.046 0.046 0.046 0.046 0.046 0.045 0.045 0.044 0.041
      0.034 0.034 0.034 0.034 0.034 0.034 0.034 0.034 0.034 0.033 0.031
      0.028 0.028 0.028 0.028 0.028 0.028 0.028 0.028 0.027 0.027 0.025
      0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.024 0.023
      0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.023 0.021

 TIME=  10. SEC          PRESSURE= 977.00 MB          TOTAL VOLUME=  339.641 CC

    J      TEMP      VMXRAT      LMXRAT     SUPERSAT ACT  DROPS   DROP RAD
           DEG K       G/KG        G/KG       PERCENT      NO/CC     MICRON
    1    296.674   17.98107   0.0000002    -5.34797       0.0      0.08779
    2    296.674   17.98107   0.0000002    -5.34819       0.0      0.08779
    3    296.674   17.98107   0.0000002    -5.34935       0.0      0.08779
    4    296.675   17.98107   0.0000002    -5.35434       0.0      0.08777
    5    296.679   17.98107   0.0000002    -5.37413       0.0      0.08771
    6    296.691   17.98107   0.0000002    -5.44467       0.0      0.08746
    7    296.730   17.98107   0.0000002    -5.66689       0.0      0.08666
    8    296.838   17.98107   0.0000002    -6.27849       0.0      0.08452
    9    297.098   17.98107   0.0000001    -7.73558       0.0      0.08003
   10    297.645   17.98107   0.0000001   -10.71558       0.0      0.07301
   11    298.650   17.98107   0.0000001   -15.91098       0.0      0.06487

 DROP RADIUS SPECTRUM
 J=     1     2     3     4     5     6     7     8     9    10    11
      0.088 0.088 0.088 0.088 0.088 0.087 0.087 0.085 0.080 0.073 0.065
      0.053 0.053 0.053 0.053 0.053 0.053 0.053 0.052 0.049 0.045 0.040
      0.040 0.040 0.040 0.040 0.040 0.039 0.039 0.038 0.036 0.034 0.030
      0.032 0.032 0.032 0.032 0.032 0.032 0.032 0.031 0.029 0.027 0.025
      0.029 0.029 0.029 0.029 0.029 0.029 0.029 0.028 0.027 0.025 0.023
      0.027 0.027 0.027 0.027 0.027 0.027 0.027 0.026 0.025 0.023 0.021

 TIME=  15. SEC          PRESSURE= 970.65 MB          TOTAL VOLUME=  341.690 CC

    J      TEMP      VMXRAT      LMXRAT     SUPERSAT ACT  DROPS   DROP RAD
           DEG K       G/KG        G/KG       PERCENT      NO/CC     MICRON
    1    296.124   17.98107   0.0000003    -2.78437       0.0      0.10846
    2    296.125   17.98107   0.0000003    -2.78882       0.0      0.10843
    3    296.128   17.98107   0.0000003    -2.80631       0.0      0.10827
    4    296.137   17.98107   0.0000003    -2.85586       0.0      0.10784
    5    296.159   17.98107   0.0000003    -2.98490       0.0      0.10670
    6    296.212   17.98107   0.0000003    -3.29733       0.0      0.10406
    7    296.331   17.98107   0.0000002    -3.99393       0.0      0.09891
    8    296.577   17.98107   0.0000002    -5.40944       0.0      0.09086
    9    297.034   17.98107   0.0000001    -7.98196       0.0      0.08093
   10    297.766   17.98107   0.0000001   -11.93606       0.0      0.07127
   11    298.650   17.98107   0.0000001   -16.45729       0.0      0.06405

 DROP RADIUS SPECTRUM
 J=     1     2     3     4     5     6     7     8     9    10    11
      0.108 0.108 0.108 0.108 0.107 0.104 0.099 0.091 0.081 0.071 0.064
      0.065 0.065 0.064 0.064 0.064 0.062 0.059 0.055 0.049 0.044 0.040
      0.047 0.047 0.047 0.047 0.047 0.046 0.044 0.041 0.037 0.033 0.030
      0.038 0.037 0.037 0.037 0.037 0.036 0.035 0.033 0.030 0.027 0.024
      0.034 0.034 0.034 0.034 0.034 0.033 0.032 0.030 0.027 0.024 0.022
      0.031 0.031 0.031 0.031 0.031 0.030 0.029 0.028 0.025 0.023 0.021

 TIME=  20. SEC          PRESSURE= 971.60 MB          TOTAL VOLUME=  341.690 CC
```

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT DROPS NO/CC	DROP RAD MICRON
1	296.219	17.98107	0.0000003	-3.24393	0.0	0.10391
2	296.222	17.98107	0.0000003	-3.26446	0.0	0.10375
3	296.235	17.98107	0.0000003	-3.33661	0.0	0.10319
4	296.263	17.98107	0.0000003	-3.50398	0.0	0.10192
5	296.323	17.98107	0.0000002	-3.85422	0.0	0.09940
6	296.441	17.98107	0.0000002	-4.53499	0.0	0.09509
7	296.653	17.98107	0.0000002	-5.74936	0.0	0.08886
8	296.998	17.98107	0.0000001	-7.68873	0.0	0.08147
9	297.489	17.98107	0.0000001	-10.37348	0.0	0.07425
10	298.079	17.98107	0.0000001	-13.48236	0.0	0.06831
11	298.650	17.98107	0.0000001	-16.37556	0.0	0.06416

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.104	0.104	0.103	0.102	0.099	0.095	0.089	0.081	0.074	0.068	0.064
	0.062	0.062	0.062	0.061	0.060	0.057	0.054	0.050	0.046	0.042	0.040
	0.046	0.046	0.045	0.045	0.044	0.042	0.040	0.037	0.034	0.032	0.030
	0.036	0.036	0.036	0.036	0.035	0.034	0.032	0.030	0.028	0.026	0.024
	0.033	0.033	0.033	0.033	0.032	0.031	0.029	0.027	0.025	0.024	0.022
	0.030	0.030	0.030	0.030	0.029	0.029	0.027	0.025	0.023	0.022	0.021

TIME= 29. SEC PRESSURE= 972.28 MB TOTAL VOLUME= 341.690 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT DROPS NO/CC	DROP RAD MICRON
1	298.314	17.98107	0.0000002	-3.73448	0.0	0.09999
2	296.323	17.98107	0.0000002	-3.78509	0.0	0.09964
3	296.351	17.98107	0.0000002	-3.95211	0.0	0.09850
4	296.410	17.98107	0.0000002	-4.29293	0.0	0.09632
5	296.516	17.98107	0.0000002	-4.90210	0.0	0.09282
6	296.690	17.98107	0.0000002	-5.89851	0.0	0.08800
7	296.954	17.98107	0.0000001	-7.38495	0.0	0.08231
8	297.316	17.98107	0.0000001	-9.37894	0.0	0.07650
9	297.798	17.98107	0.0000001	-11.74488	0.0	0.07131
10	298.227	17.98107	0.0000001	-14.18430	0.0	0.06717
11	298.650	17.98107	0.0000001	-16.31896	0.0	0.06423

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.100	0.100	0.099	0.098	0.093	0.088	0.082	0.077	0.071	0.067	0.064
	0.060	0.060	0.059	0.058	0.056	0.053	0.050	0.047	0.044	0.041	0.040
	0.044	0.044	0.044	0.043	0.041	0.040	0.037	0.035	0.033	0.031	0.030
	0.035	0.035	0.035	0.034	0.033	0.032	0.030	0.028	0.027	0.025	0.024
	0.032	0.032	0.032	0.031	0.030	0.029	0.028	0.026	0.024	0.023	0.022
	0.030	0.029	0.029	0.029	0.028	0.027	0.025	0.024	0.023	0.022	0.021

TIME= 30. SEC PRESSURE= 972.76 MB TOTAL VOLUME= 341.690 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT DROPS NO/CC	DROP RAD MICRON
1	296.434	17.98107	0.0000002	-4.38322	0.0	0.09565
2	296.449	17.98107	0.0000002	-4.44650	0.0	0.09514
3	296.496	17.98107	0.0000002	-4.73778	0.0	0.09360
4	296.583	17.98107	0.0000002	-5.23959	0.0	0.09096
5	296.724	17.98107	0.0000002	-6.04057	0.0	0.08728
6	296.930	17.98107	0.0000001	-7.20163	0.0	0.08284
7	297.208	17.98107	0.0000001	-8.74200	0.0	0.07811
8	297.551	17.98107	0.0000001	-10.60275	0.0	0.07359
9	297.935	17.98107	0.0000001	-12.63092	0.0	0.06966

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

```
 10   298.317  17.98107 0.0000001 -14.60167      0.0       0.06654
 11   298.650  17.98107 0.0000001 -16.27580      0.0       0.06428

DROP RADIUS SPECTRUM
 J=     1      2      3      4      5      6      7      8      9     10     11
     0.096  0.095  0.094  0.091  0.087  0.083  0.078  0.074  0.070  0.067  0.064
     0.058  0.057  0.057  0.055  0.053  0.051  0.048  0.045  0.043  0.041  0.040
     0.043  0.042  0.042  0.041  0.039  0.038  0.036  0.034  0.032  0.031  0.030
     0.034  0.034  0.034  0.033  0.032  0.030  0.029  0.027  0.026  0.025  0.024
     0.031  0.031  0.031  0.030  0.029  0.028  0.026  0.025  0.024  0.023  0.022
     0.029  0.029  0.028  0.028  0.027  0.026  0.024  0.023  0.022  0.021  0.021

TIME=  35. SEC          PRESSURE= 973.16 MB          TOTAL VOLUME=  341.690 CC

   J      TEMP      VMXRAT      LMXRAT   SUPERSAT ACT  DROPS   DROP RAD
          DEG K       G/KG        G/KG     PERCENT     NO/CC     MICRON
   1   296.584  17.98107 0.0000002  -5.20370      0.0       0.09109
   2   296.609  17.98107 0.0000002  -5.31582      0.0       0.09053
   3   296.664  17.98107 0.0000002  -5.66036      0.0       0.08890
   4   296.770  17.98107 0.0000002  -6.26552      0.0       0.08629
   5   296.930  17.98107 0.0000001  -7.16236      0.0       0.08293
   6   297.148  17.98107 0.0000001  -8.36423      0.0       0.07913
   7   297.417  17.98107 0.0000001  -9.84410      0.0       0.07527
   8   297.730  17.98107 0.0000001 -11.51946      0.0       0.07168
   9   298.062  17.98107 0.0000001 -13.25442      0.0       0.06860
  10   298.379  17.98107 0.0000001 -14.88217      0.0       0.06613
  11   298.650  17.98107 0.0000001 -16.24132      0.0       0.06433

DROP RADIUS SPECTRUM
 J=     1      2      3      4      5      6      7      8      9     10     11
     0.091  0.091  0.089  0.086  0.083  0.079  0.075  0.072  0.069  0.066  0.064
     0.055  0.055  0.054  0.053  0.051  0.048  0.046  0.044  0.042  0.041  0.040
     0.041  0.041  0.040  0.039  0.038  0.036  0.035  0.033  0.032  0.031  0.030
     0.033  0.033  0.032  0.031  0.030  0.029  0.028  0.027  0.026  0.025  0.024
     0.030  0.030  0.029  0.029  0.028  0.027  0.026  0.025  0.024  0.023  0.022
     0.028  0.027  0.027  0.026  0.026  0.025  0.024  0.023  0.022  0.021  0.021

TIME=  40. SEC          PRESSURE= 973.49 MB          TOTAL VOLUME=  341.690 CC

   J      TEMP      VMXRAT      LMXRAT   SUPERSAT ACT  DROPS   DROP RAD
          DEG K       G/KG        G/KG     PERCENT     NO/CC     MICRON
   1   296.753  17.98107 0.0000002  -6.13780      0.0       0.08679
   2   296.776  17.98107 0.0000002  -6.26440      0.0       0.08627
   3   296.844  17.98107 0.0000002  -6.64702      0.0       0.08477
   4   296.959  17.98107 0.0000001  -7.29455      0.0       0.08244
   5   297.124  17.98107 0.0000001  -8.20902      0.0       0.07955
   6   297.337  17.98107 0.0000001  -9.37595      0.0       0.07639
   7   297.598  17.98107 0.0000001 -10.74434      0.0       0.07324
   8   297.871  17.98107 0.0000001 -12.23011      0.0       0.07034
   9   298.157  17.98107 0.0000001 -13.71899      0.0       0.06785
  10   298.425  17.98107 0.0000001 -15.08488      0.0       0.06585
  11   298.650  17.98107 0.0000001 -16.21299      0.0       0.06436

DROP RADIUS SPECTRUM
 J=     1      2      3      4      5      6      7      8      9     10     11
     0.087  0.086  0.085  0.082  0.080  0.076  0.073  0.070  0.068  0.066  0.064
     0.053  0.052  0.052  0.050  0.049  0.047  0.045  0.043  0.042  0.041  0.040
     0.039  0.039  0.038  0.037  0.036  0.035  0.034  0.032  0.031  0.031  0.030
     0.032  0.031  0.031  0.030  0.029  0.028  0.027  0.026  0.026  0.025  0.024
     0.029  0.029  0.028  0.028  0.027  0.026  0.025  0.024  0.023  0.023  0.022
     0.027  0.026  0.026  0.026  0.025  0.024  0.023  0.022  0.022  0.021  0.021
```

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

TIME= 45. SEC PRESSURE= 973.77 MB TOTAL VOLUME= 341.690 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	296.931	17.98107	0.0000001	-7.11284	0.0	0.08306
2	296.955	17.98107	0.0000001	-7.24309	0.0	0.08261
3	297.025	17.98107	0.0000001	-7.63274	0.0	0.08131
4	297.141	17.98107	0.0000001	-8.27695	0.0	0.07934
5	297.302	17.98107	0.0000001	-9.16043	0.0	0.07692
6	297.503	17.98107	0.0000001	-10.24983	0.0	0.07430
7	297.735	17.98107	0.0000001	-11.48848	0.0	0.07172
8	297.984	17.98107	0.0000001	-12.79678	0.0	0.06934
9	298.232	17.98107	0.0000001	-14.07947	0.0	0.06729
10	298.460	17.98107	0.0000001	-15.23873	0.0	0.06564
11	298.650	17.98107	0.0000001	-16.18928	0.0	0.06439

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.083	0.083	0.081	0.079	0.077	0.074	0.072	0.069	0.067	0.066	0.064
	0.051	0.050	0.050	0.049	0.047	0.046	0.044	0.043	0.042	0.041	0.040
	0.038	0.037	0.037	0.036	0.035	0.034	0.033	0.032	0.031	0.030	0.030
	0.030	0.030	0.030	0.029	0.028	0.028	0.027	0.026	0.025	0.025	0.024
	0.028	0.028	0.027	0.027	0.026	0.025	0.025	0.024	0.023	0.023	0.022
	0.026	0.026	0.025	0.025	0.024	0.023	0.023	0.022	0.022	0.021	0.021

TIME= 50. SEC PRESSURE= 974.00 MB TOTAL VOLUME= 341.690 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	297.108	17.98107	0.0000001	-8.07123	0.0	0.07994
2	297.130	17.98107	0.0000001	-8.19769	0.0	0.07956
3	297.199	17.98107	0.0000001	-8.57363	0.0	0.07848
4	297.311	17.98107	0.0000001	-9.18602	0.0	0.07684
5	297.462	17.98107	0.0000001	-10.00971	0.0	0.07484
6	297.648	17.98107	0.0000001	-11.00391	0.0	0.07268
7	297.857	17.98107	0.0000001	-12.11096	0.0	0.07054
8	298.077	17.98107	0.0000001	-13.25881	0.0	0.06857
9	298.293	17.98107	0.0000001	-14.38769	0.0	0.06686
10	298.488	17.98107	0.0000001	-15.35971	0.0	0.06547
11	298.650	17.98107	0.0000001	-16.18919	0.0	0.06442

DROP RADIUS SPECTRUM

J=	1	2	3	4	5	6	7	8	9	10	11
	0.080	0.080	0.078	0.077	0.075	0.073	0.071	0.069	0.067	0.065	0.064
	0.049	0.049	0.048	0.047	0.046	0.045	0.043	0.042	0.041	0.040	0.040
	0.036	0.036	0.036	0.035	0.034	0.033	0.033	0.032	0.031	0.030	0.030
	0.029	0.029	0.029	0.028	0.028	0.027	0.026	0.026	0.025	0.025	0.024
	0.027	0.027	0.027	0.026	0.026	0.025	0.024	0.024	0.023	0.023	0.022
	0.025	0.025	0.025	0.024	0.024	0.023	0.022	0.022	0.021	0.021	0.021

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

```
INPUT PARAMETERS FOR SDL CHAMBER EXPERIMENT

INITIAL CHAMBER TEMP        291.150 DEG K
INITIAL CHAMBER PRESSURE 1000.000 MB
REFERENCE VOLUME              1.000 CC
EXPANSION RATE                0.0   MB/SEC
EXPANSION DURATION            0.0   SEC
EXPERIMENT DURATION          50.000 SEC
TEMP RAMP DURATION           25.000 SEC
TOP PLATE RAMP RATE          -0.040 DEG/SEC
BOTTOM PLATE RAMP RATE        0.040 DEG/SEC
ACCOMMODATION COEFF           1.000
CONDENSATION COEFF            0.030

GRID PARAMETERS
     RECTANGULAR COORDINATES
     NUMBER OF SPACE POINTS=  11
     GRID SPACING          =  0.20 CM

     INDEX  POSITION        VOLUME          AREA
         1   0.0        0.10000D 00    0.1000UD 01
         2   0.20000    0.200000 00    0.100000 01
         3   0.40000    0.20000D 00    0.10000D 01
         4   0.60000    0.200000 00    0.100000 01
         5   0.80000    0.20000D 00    0.10000D 01
         6   1.00000    0.200000 00    0.100000 01
         7   1.20000    0.200000 00    0.100000 01
         8   1.40000    0.200000 00    0.100000 01
         9   1.60000    0.200000 00    0.100000 01
        10   1.80000    0.200000 00    0.100000 01
        11   2.00000    0.100000 00

INTEGRATION TIME INCREMENT =  0.063

AEROSOL/DROPLET PARAMETERS

NUMBER OF DROPLET CLASSES=  1

CLASS,    NO/CC      CRIT SSAT     CRIT RADIUS  INITIAL RADIUS          A              B
    1      1.00       0.01000    0.7442950-05   0.4296040-05   0.1116950-06   0.2061100-17

TIME=   5. SEC          PRESSURE=1000.00 MB          TOTAL VOLUME=    2.000 CC

  J     TEMP     VMIXRAT    LMXRAT   SUPERSAT ACT  DROPS   DROP RAD
        DEG K      G/KG      G/KG     PERCENT      NO/CC     MICRON
    1  291.350  13.27090  0.0000000   0.00000       0.0     0.04298
    2  291.301  13.23202  0.0000000   0.02137       0.0     0.04316
    3  291.258  13.19552  0.0000000   0.02151       0.0     0.04316
    4  291.219  13.16241  0.0000000   0.01757       0.0     0.04312
    5  291.184  13.13157  0.0000000   0.01093       0.0     0.04306
    6  291.150  13.10188  0.0000000   0.00290       0.0     0.04299
    7  291.116  13.07223  0.0000000  -0.00525       0.0     0.04292
    8  291.081  13.04151  0.0000000  -0.01233       0.0     0.04286
    9  291.042  13.00859  0.0000000  -0.01716       0.0     0.04282
   10  290.999  12.97237  0.0000000  -0.01866       0.0     0.04280
   11  290.950  12.93301  0.0000000  -0.00000       0.0     0.04295

TIME=  10. SEC          PRESSURE=1000.01 MB          TOTAL VOLUME=    2.000 CC

  J     TEMP     VMIXRAT    LMXRAT   SUPERSAT ACT  DROPS   DROP RAD
        DEG K      G/KG      G/KG     PERCENT      NO/CC     MICRON
```

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

1	291.550	13.44234	0.0000000	0.00000	0.0	0.04300
2	291.461	13.36954	0.0000000	0.02705	0.0	0.04322
3	291.378	13.29914	0.0000000	0.03134	0.0	0.04325
4	291.300	13.23219	0.0000000	0.03024	0.0	0.04323
5	291.224	13.16755	0.0000000	0.02526	0.0	0.04318
6	291.150	13.10413	0.0000000	0.01781	0.0	0.04311
7	291.077	13.04079	0.0000000	0.00918	0.0	0.04304
8	291.001	12.97644	0.0000000	0.00053	0.0	0.04296
9	290.923	12.90994	0.0000000	-0.00710	0.0	0.04289
10	290.839	12.84019	0.0000000	-0.01281	0.0	0.04284
11	290.750	12.76813	0.0000000	-0.00000	0.0	0.04294

TIME= 15. SEC PRESSURE=1000.01 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	291.750	13.61573	0.0000000	0.00000	0.0	0.04301
2	291.621	13.50903	0.0000000	0.03733	0.0	0.04332
3	291.499	13.40474	0.0000000	0.04980	0.0	0.04341
4	291.380	13.30395	0.0000000	0.05436	0.0	0.04344
5	291.265	13.20552	0.0000000	0.05278	0.0	0.04342
6	291.151	13.10836	0.0000000	0.04660	0.0	0.04336
7	291.037	13.01133	0.0000000	0.03706	0.0	0.04327
8	290.922	12.91332	0.0000000	0.02530	0.0	0.04316
9	290.803	12.81322	0.0000000	0.01214	0.0	0.04304
10	290.680	12.70991	0.0000000	-0.00174	0.0	0.04292
11	290.550	12.60432	0.0000000	0.00000	0.0	0.04292

TIME= 20. SEC PRESSURE=1000.02 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	291.950	13.79109	0.0000000	0.00000	0.0	0.04303
2	291.782	13.63050	0.0000000	0.03271	0.0	0.04346
3	291.619	13.51234	0.0000000	0.07678	0.0	0.04366
4	291.461	13.37771	0.0000000	0.08981	0.0	0.04376
5	291.306	13.24550	0.0000000	0.09353	0.0	0.04378
6	291.152	13.11458	0.0000000	0.08940	0.0	0.04373
7	290.998	12.98384	0.0000000	0.07865	0.0	0.04363
8	290.842	12.85218	0.0000000	0.06222	0.0	0.04347
9	290.683	12.71844	0.0000000	0.04079	0.0	0.04327
10	290.520	12.58153	0.0000000	0.01471	0.0	0.04304
11	290.350	12.44237	0.0000000	0.00000	0.0	0.04291

TIME= 25. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	292.150	13.96843	0.0000000	0.00000	0.0	0.04304
2	291.942	13.79397	0.0000000	0.07249	0.0	0.04365
3	291.740	13.62195	0.0000000	0.11212	0.0	0.04399
4	291.542	13.45348	0.0000000	0.13053	0.0	0.04420
5	291.347	13.28747	0.0000000	0.14742	0.0	0.04429
6	291.153	13.12279	0.0000000	0.14620	0.0	0.04426
7	290.959	12.95832	0.0000000	0.13396	0.0	0.04413
8	290.763	12.79296	0.0000000	0.11145	0.0	0.04390
9	290.564	12.62557	0.0000000	0.07904	0.0	0.04360
10	290.360	12.45504	0.0000000	0.03667	0.0	0.04321
11	290.150	12.28226	0.0000000	0.00001	0.0	0.04289

TIME= 30. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	292.150	13.96840	0.0000000	-0.00000	0.0	0.04304
2	291.951	13.80008	0.0000000	0.05996	0.0	0.04354
3	291.752	13.63169	0.0000000	0.10764	0.0	0.04396
4	291.552	13.46323	0.0000000	0.14268	0.0	0.04427
5	291.352	13.29470	0.0000000	0.16471	0.0	0.04447
6	291.152	13.12611	0.0000000	0.17334	0.0	0.04454
7	290.952	12.95746	0.0000000	0.16815	0.0	0.04447
8	290.752	12.78875	0.0000000	0.14868	0.0	0.04426
9	290.552	12.61997	0.0000000	0.11446	0.0	0.04392
10	290.351	12.45112	0.0000000	0.06499	0.0	0.04346
11	290.150	12.28222	0.0000000	0.00001	0.0	0.04289

TIME= 35. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	292.150	13.96840	0.0000000	0.00000	0.0	0.04304
2	291.951	13.80013	0.0000000	0.06045	0.0	0.04355
3	291.751	13.63178	0.0000000	0.10858	0.0	0.04397
4	291.552	13.46336	0.0000000	0.14399	0.0	0.04428
5	291.352	13.29486	0.0000000	0.16626	0.0	0.04448
6	291.152	13.12627	0.0000000	0.17499	0.0	0.04455
7	290.952	12.95762	0.0000000	0.16973	0.0	0.04448
8	290.752	12.78888	0.0000000	0.15004	0.0	0.04427
9	290.552	12.62006	0.0000000	0.11546	0.0	0.04393
10	290.351	12.45117	0.0000000	0.06553	0.0	0.04347
11	290.150	12.28222	0.0000000	0.00001	0.0	0.04289

TIME= 40. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	292.150	13.96840	0.0000000	0.00000	0.0	0.04304
2	291.951	13.80013	0.0000000	0.06048	0.0	0.04355
3	291.751	13.63179	0.0000000	0.10863	0.0	0.04397
4	291.552	13.46336	0.0000000	0.14406	0.0	0.04428
5	291.352	13.29486	0.0000000	0.16635	0.0	0.04448
6	291.152	13.12628	0.0000000	0.17508	0.0	0.04455
7	290.952	12.95762	0.0000000	0.16982	0.0	0.04448
8	290.752	12.78888	0.0000000	0.15012	0.0	0.04428
9	290.552	12.62007	0.0000000	0.11552	0.0	0.04393
10	290.351	12.45117	0.0000000	0.06556	0.0	0.04347
11	290.150	12.28222	0.0000000	0.00001	0.0	0.04289

TIME= 45. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT ACT PERCENT	DROPS NO/CC	DROP RAD MICRON
1	292.150	13.96840	0.0000000	0.00000	0.0	0.04304
2	291.951	13.80013	0.0000000	0.06048	0.0	0.04355
3	291.751	13.63179	0.0000000	0.10863	0.0	0.04397
4	291.552	13.46336	0.0000000	0.14406	0.0	0.04428
5	291.352	13.29486	0.0000000	0.16635	0.0	0.04448
6	291.152	13.12628	0.0000000	0.17508	0.0	0.04455
7	290.952	12.95762	0.0000000	0.16982	0.0	0.04448
8	290.752	12.78888	0.0000000	0.15012	0.0	0.04428
9	290.552	12.62007	0.0000000	0.11552	0.0	0.04393
10	290.351	12.45117	0.0000000	0.06556	0.0	0.04347
11	290.150	12.28222	0.0000000	0.00001	0.0	0.04289

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

TIME= 50. SEC PRESSURE=1000.04 MB TOTAL VOLUME= 2.000 CC

J	TEMP DEG K	VMXRAT G/KG	LMXRAT G/KG	SUPERSAT PERCENT	ACT DROPS NO/CC	DROP RAD MICRON
1	292.150	13.96840	0.0000000	0.00000	0.0	0.04304
2	291.951	13.80013	0.0000000	0.06048	0.0	0.04355
3	291.751	13.63179	0.0000000	0.10864	0.0	0.04397
4	291.552	13.46336	0.0000000	0.14406	0.0	0.04428
5	291.352	13.29486	0.0000000	0.16635	0.0	0.04448
6	291.152	13.12628	0.0000000	0.17508	0.0	0.04455
7	290.952	12.95762	0.0000000	0.16982	0.0	0.04448
8	290.752	12.78888	0.0000000	0.15012	0.0	0.04428
9	290.552	12.62007	0.0000000	0.11552	0.0	0.04393
10	290.351	12.45117	0.0000000	0.06556	0.0	0.04347
11	290.150	12.28222	0.0000000	0.00001	0.0	0.04289

* END SIMULATION *

Figure 3-35. Sample Output of the Multiple Experiment Run (Cont.)

SECTION 4 - INTERACTIVE MODE OPERATION INSTRUCTIONS

The following describes the operation of the ACPL Simulation System in the interactive graphics mode. The interactive system must first be initialized. Procedures required for starting up and operations of the interactive graphic capability (as implemented for the PRIME 400 Computer System) are described in the following subsections.

4.1 INITIATION OF GRAPHIC DEVICES

4.1.1 Power Up

For operation under the PRIMOS system, the Tektronix 4014 terminal's front panel controls should be set in the following states:

POWER	-ON
LOCAL LINE	-LINE
ASCII/ALT	-ASCII
ALT	-NA
1	-LEFT SIDE DOWN
2	-RIGHT SIDE DOWN
3	-RIGHT SIDE DOWN
1 OFF 2	-OFF
FULL	-NA
RELEASE	-RIGHT SIDE DOWN
AUTO PRINT COPY OFF	-OFF
TTY	-DOWN
LOCK	

The hardcopy unit is turned on and the light-dark control knob should be initially set at a point half way between light-dark.

4.1.2 LOGIN

Once the Tektronix terminal is powered up and the PRIMOS system is in operation, the PRIMOS will respond to the break key by printing "QUIT" on the screen. Then the user may enter LOGIN DAN, and press the return key. The PRIMOS will acknowledge when it has completed log in procedure and will print "OK," on the screen. OK, signifies that PRIMOS is ready for keyboard commands. The ACPL system may then be run thereafter.

4.2 CONTROL PROCEDURES

PRIMOS is ready for keyboard commands to control the ACPL Simulation System after "OK," is displayed on the screen.

The ACPL Simulation System may be run using existing input, in a file named DATA, or the user may read his own data in.

The system has an interactive capability for changing input so that in most cases it will be more convenient to change the existing data rather than create and read in a new input data deck.

The following controls provide a way for user to execute the program using the input data file that was created from user input changes made during a previous execution.

Keyboard Entry	Comments
CNAME DATA,DATSAV	Saves current data in file named DATSAV.
CNAME NEWDAT,DATA	Changes name of new data, NEWDAT, to DATA.
CNAME DATA,NEWDAT	Restores data files to what they were before the above two entries were made.
CNAME DATSAV,DATA	

To read in input data, the user turns on the card reader, places the input deck (with a blank card as the last card) into the card reader and depresses the reset button. Then the user enters CO ACPL and presses the return key. The PRIMOS system then reads in the input deck and begins program execution. Program execution may be halted at any time by pressing the break key.

If an error is made in typing in an entry, then type "?"; thereafter, depress the return key, and then re-type the entry.

Various outputs of the simulation can be displayed. These include seven optional plot outputs.

- o Inquires to the user.
- o Symbol definitions, constant values, and initial values.
- o Input data for adiabatic expansion.
- o Plot of radii and S-1 vs. time.
- o Plot of pressure vs. time.
- o Plot of volume vs. time.
- o Plot of temperature vs. time.
- o Plot of NW vs. time.
- o Plot of NV vs. time.
- o Plot of NG vs. time.
- o Droplet radii time history.
- o Pressure, volume, S-1, and temperature time history.
- o NW, NV, and NG time history.

User's response is required every time the terminal bell rings. The program also has pauses to allow the user to get a hardcopy of each of the seven displays. To get a hardcopy, press the keyboard hardcopy button, then press the return key to continue. If hardcopy is not needed, press return key to continue.

The first screen display (Figure 4-1) lists the experimental modules which may be executed, and a title and date appearing on a subsequent screen display, and the experimental module to be executed. User's response after each sound of bell:

- o Enter title that is to appear on subsequent displays, and press return key to continue.
- o Enter date that is to appear in subsequent displays, and press return key to continue.
- o Enter user entry code.
- o Press the keyboard hardcopy button to get a hardcopy, and/or return key to continue.

The second screen display (Figure 4-2) then appears. It is a list of symbol definitions, constant values, and initial values.

ACPL SIMULATION SYSTEM

EXPERIMENTAL MODULE	USER ENTRY CODE
ADIABATIC EXPANSION	A
NON-ADIABATIC EXPANSION	N
STATIC DIFFUSION LIQUID MODULE (CONSTANT PRESSURE)	C
STATIC DIFFUSION LIQUID MODULE (RAPID EXPANSION)	R
CONTINUOUS FLOW	F

ENTER TITLE (UP TO 80 CHARACTERS):

ENTER DATE:
ENTER USER ENTRY CODE:
PRESS RETURN KEY TO CONTINUE

Figure 4-1. Display of Optional Models for the ACPL Simulation

THIS IS A DEMONSTRATION

DATE JULY 11, 1978

SYMBOL DEFINITIONS, CONSTANT VALUES, AND INITIAL VALUES

PI ----- PI	3.141592653+D0		
AKELVN - KVN EFFECT COEFF (FUNCTION)		(CM)	
HCOND -- THERMAL COND OF AIR (FUNCTION)		(ERG/CM DEG SEC)	
D ------ DIFFUSION COEFFICIENT (FUNCTION)		(CM**2/SEC)	
MUTVAP - MOLECULAR WEIGHT OF WATER	0.180160000D 02	(GM/MOLE)	
MUTAIR - MOLECULAR WEIGHT OF DRY AIR	0.289700000D 02	(GM/MOLE)	
RHOLIQ - DENSITY OF LIQUID WATER	0.100000000D 01	(GM/CM**3)	
RGAS --- UNIVERSAL GAS CONSTANT	0.831440000D 08	(ERG/MOLE DEG)	
CPAIR -- MOLECULAR HEAT CAPACITY OF DRY AIR	0.291004000D 09	(ERG/MOLE DEG)	
CPVAP -- MOLECULAR HEAT CAPACITY OF WATER VAP.	0.332576000D 09	(ERG/MOLE DEG)	
CLIQ --- MOLECULAR CAPACITY OF LIQUID WATER	0.754150000D 09	(ERG/MOLE DEG)	
LHTVAP - LATENT HEAT OF CONDENSATION PER GRAM	0.000000000D 00	(ERG/GM)	
GAMMA -- SPECIFIC HEAT RATIO	0.140000000D 01		

Figure 4-2. Display of Constant Parameters

User's response after sound of bell:

- Press the keyboard hardcopy button to get a hardcopy, and/or return key to continue.

The third screen display (Figure 4-3) then appears. It lists changeable input items.

User's response after sound of bell:

- Press the keyboard hardcopy button to get a hardcopy, and/or press return key to continue.

The fourth screen display (Figure 4-4) then appears. It is an inquiry to the user.

User's response after sound of bell:

- Enter letter G and press return button to continue on to the next screen display, or enter letter C and press return button to change any of the input items shown on the third screen display.

- Enter a three-digit number corresponding to the line item to be changed and press section key.

- Enter new value to format specified on the screen (D16.9 or 16).

- Enter the letter F and press the return key to continue on to the next required response, or press return key to go back to 2.

- Enter the letter D to display the third screen display again, with new input values, press hardcopy key to get a hardcopy, and/or press return key to continue.

After G is entered in Figure 4-4, the fifth screen display (Figure 4-5) appears if user has made changes to the input data. He enters Y and presses return key to save his input data changes, and continues program execution.

THIS IS A DEMONSTRATION

DATE JULY 11, 1978

DYNAMIC INPUT DATA FOR ADIABATIC EXPANSION

DESCRIPTION	CURRENT VALUE	LINE	NEW VALUE	UNITS
ALPHA -- THERMAL ACCOMODATION COEFF.	0.100000000D 01	1		
BETA--- CONDENSATION COEFFICIENT	0.300000000D-01	2		
SURFT -- SURFACE TENSION	0.750000000D 02	3		(DYNE/CM)
PRESSO - INITIAL EC PRESSURE	0.100000000D 07	4		(DYNE/CM**2)
TEMPO -- INITIAL EC TEMPERATURE	0.293150000D 03	5		(DEG K)
VOL0 --- INITIAL PARCEL VOLUME	0.100000000D 01	6		(CM**3)
PSATUR - SATURATOR PRESSURE	0.100000000D 07	7		(DYNE/CM**2)
TSATUR - SATURATOR TEMPERATURE	0.293150000D 03	8		(DEG K)
NPART -- NO. PARTICLES IN I-TH SIZE CLASS	25	9		
	100	10		
	125	11		
	126	12		
	100	13		
	25	14		
SIGMAC - CRITICAL SATURATION RATIO OF I-TH SIZE	0.200000000D-02	15		
	0.400000020D-02	16		
	0.600200000D-02	17		
	0.800000200D-02	18		
	0.900000000D-02	19		
	0.100000000D-01	20		
TIMEF -- TIME OF END OF SIMULATION	0.100000000D 03	21		(SEC)
TIME0 -- TIME OF START	0.000000000D 00	22		(SEC)
DELTAT - STEP SIZE FOR INTEGRATION	0.500000000D-02	23		(SEC)
NCLASS - NO. OF CLASSES OF PARTICLES	6	24		
PDOT --- DP/DT RATE OF PRESSURE CHANGE	0.000000000D 00	25		(DYNE/(CM**2*SEC))
U ------ UPDRAFT VELOCITY	0.100000000D 03	26		(CM/SEC)

Figure 4-3. Display of Dynamic Input Data

```
ENTER 0 TO CONTINUE, OR C TO CHANGE INPUT: C
ENTER LINE NUMBER OF ITEM TO BE CHANGED: 3
ENTER NEW VALUE (D16.9 FORMAT):0.85D02
ENTER F IF FINISHED CHANGING INPUT DATA
ENTER LINE NUMBER OF ITEM TO BE CHANGED: 18
ENTER NEW VALUE (I6 FORMAT):    400
ENTER F IF FINISHED CHANGING INPUT DATA
ENTER LINE NUMBER OF ITEM TO BE CHANGED: 19
ENTER NEW VALUE (D16.9 FORMAT):05D2'''.05D03
ENTER F IF FINISHED CHANGING INPUT DATA
ENTER LINE NUMBER OF ITEM TO BE CHANGED: 24
ENTER NEW VALUE (I6 FORMAT):     8
ENTER F IF FINISHED CHANGING INPUT DATA
ENTER LINE NUMBER OF ITEM TO BE CHANGED: 88
ENTER NEW VALUE (D16.9 FORMAT):.1D4
ENTER F IF FINISHED CHANGING INPUT DATA F
ENTER D TO DISPLAY NEW AND OLD INPUT DATA D
```

Figure 4-4. Display of Item Changes

```
ENTER Y TO SAVE CHANGES IN FILE NEWDAT.
```

Figure 4-5. Display of Changes Being Saved

The sixth screen display (Figure 4-6) then appears. It asks the user to specify procedure options and tells him how to terminate the run, or continue sequentially. User's response:

- o Press return key to continue sequentially, or, enter user entry code, or, press break key to terminate.

The sixth screen display reappears after each output item is completed.

4.3 PLOT DISPLAY OPTIONS

Once the Procedural Options display (Figure 4-6) appears and a bell rings, the user may enter any one of the digits 1 through 9 to get a particular plot display. A bell will ring after each completion of screen display, then the user may make a hardcopy by pressing the hardcopy key, and/or press the return key to continue. Each of the optional displays, as listed in Figure 4-6, is illustrated in Figures 4-7 through 4-16.

4.4 NUMERICAL DISPLAY IMAGES

After this screen display appears and a bell rings, the user may enter 10 and press the return key to display numerical values in column form. A bell will ring after each completion of screen display, then the user may make a hardcopy by pressing the hardcopy key, and/or press the return key to continue. (Reference Figure 4-6.)

4.5 ACPL SIMULATION SYSTEM DISPLAYS

4.5.1 Initial ACPL Simulation Run Display

To be added.

4.5.2 ACPL Operation Mode Selection Display

To be added.

PROCEDURE OPTIONS	USER ENTRY CODE
TIME HISTORY OF DROPLET RADII PLOT	1
TIME HISTORY OF PRESSURE PLOT	2
TIME HISTORY OF VOLUME PLOT	3
TIME HISTORY OF TEMPERATURE PLOT	4
TIME HISTORY OF NW PLOT	5
TIME HISTORY OF NV PLOT	6
TIME HISTORY OF NG PLOT	7
LIQUID MIXING RATIO PLOT	8
ACTIVATED DROPS PLOT	9
NUMERICAL VALUES IN COLUMN FORM	10
RETURN TO BEGINNING	11

PRESS RETURN KEY TO CONTINUE SEQUENTIALLY, OR ENTER USER ENTRY CODE,
OR PRESS BREAK KEY TO TERMINATE

Figure 4-6. Display of Procedural Options

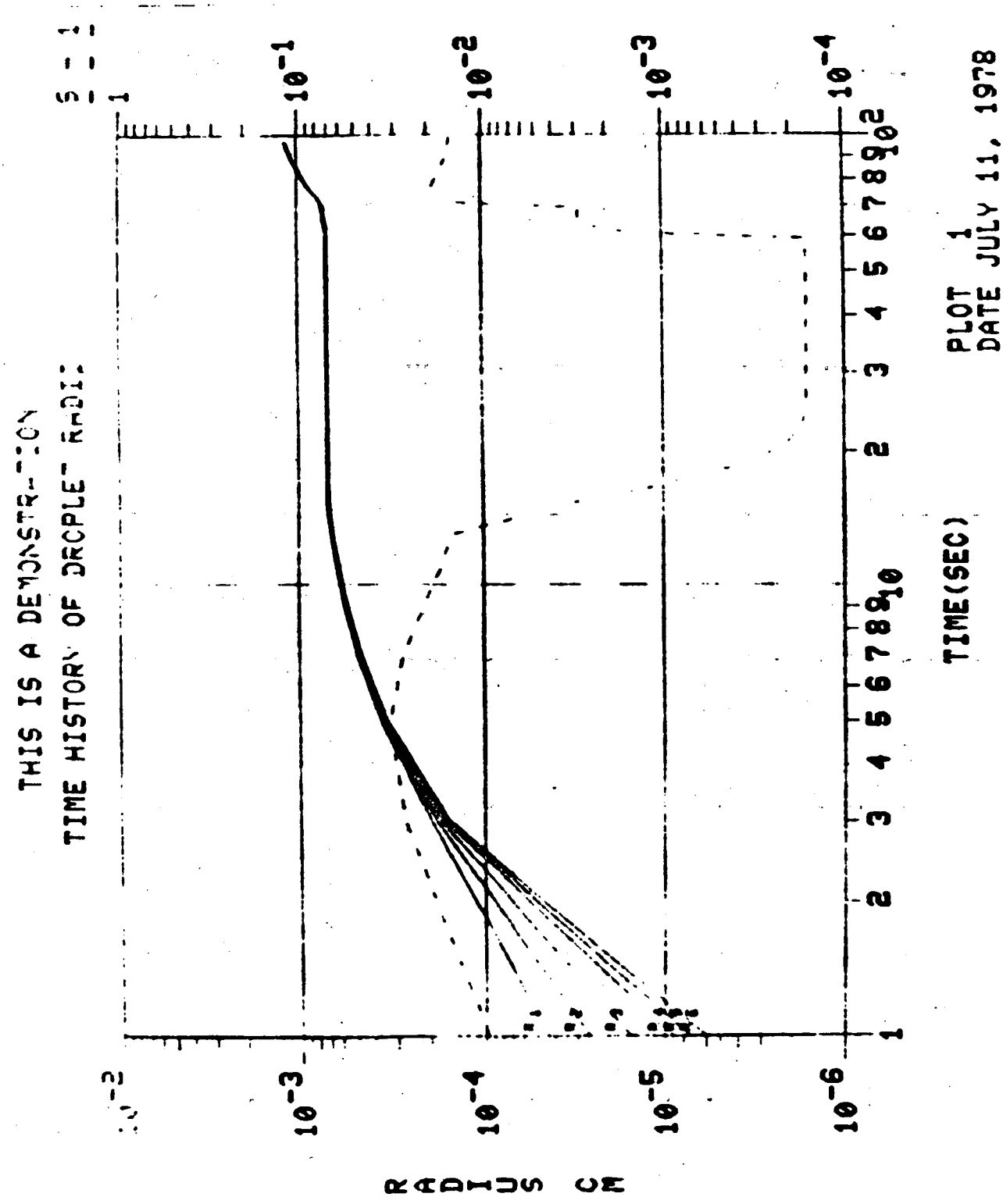

Figure 4-7. Display of Droplet Radii vs. Time

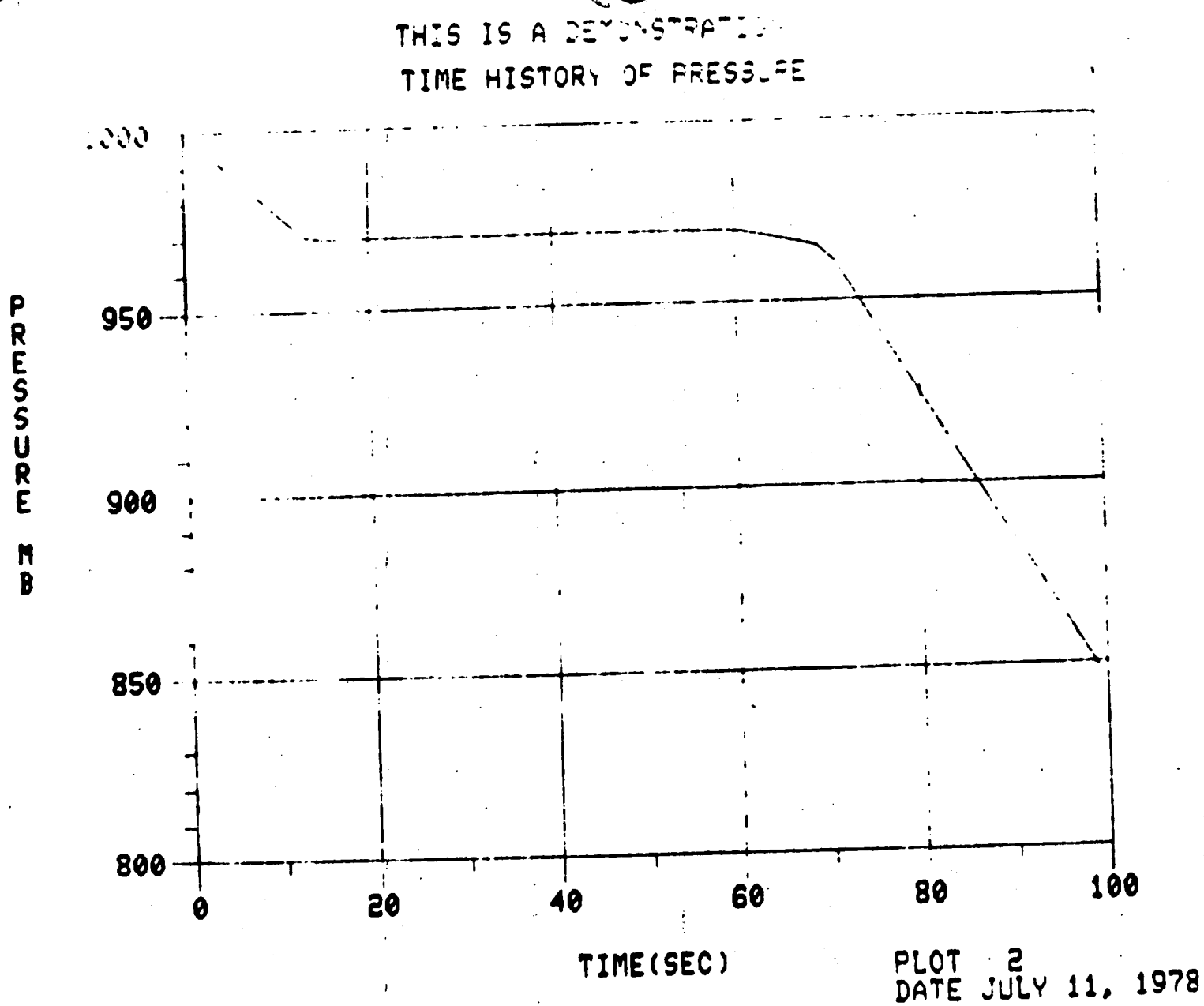

Figure 4-8. Display of Chamber Pressure vs. Time

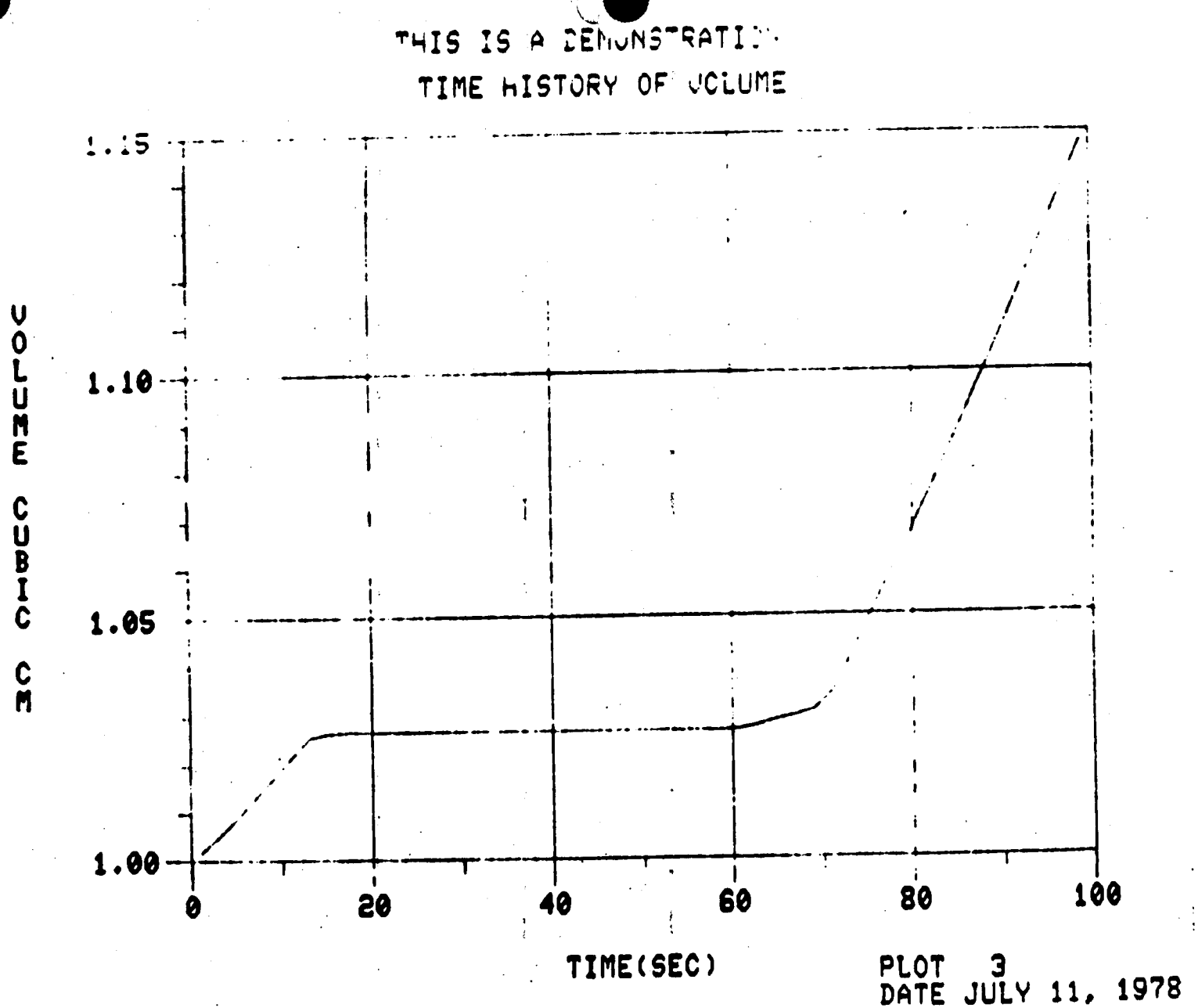

Figure 4-9. Display of Gas Volume vs. Time

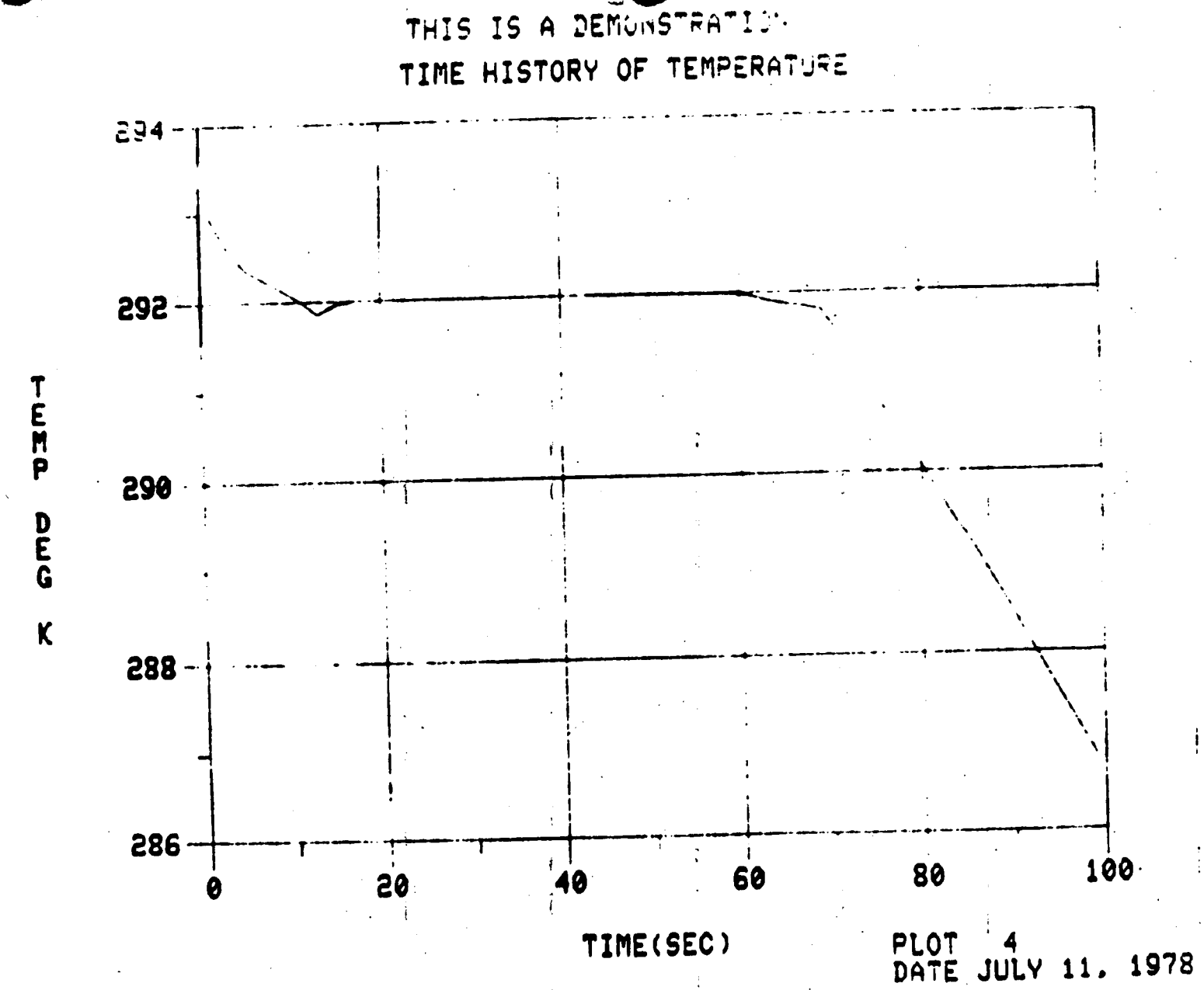

Figure 4-10. Display of Gas Temperature vs. Time

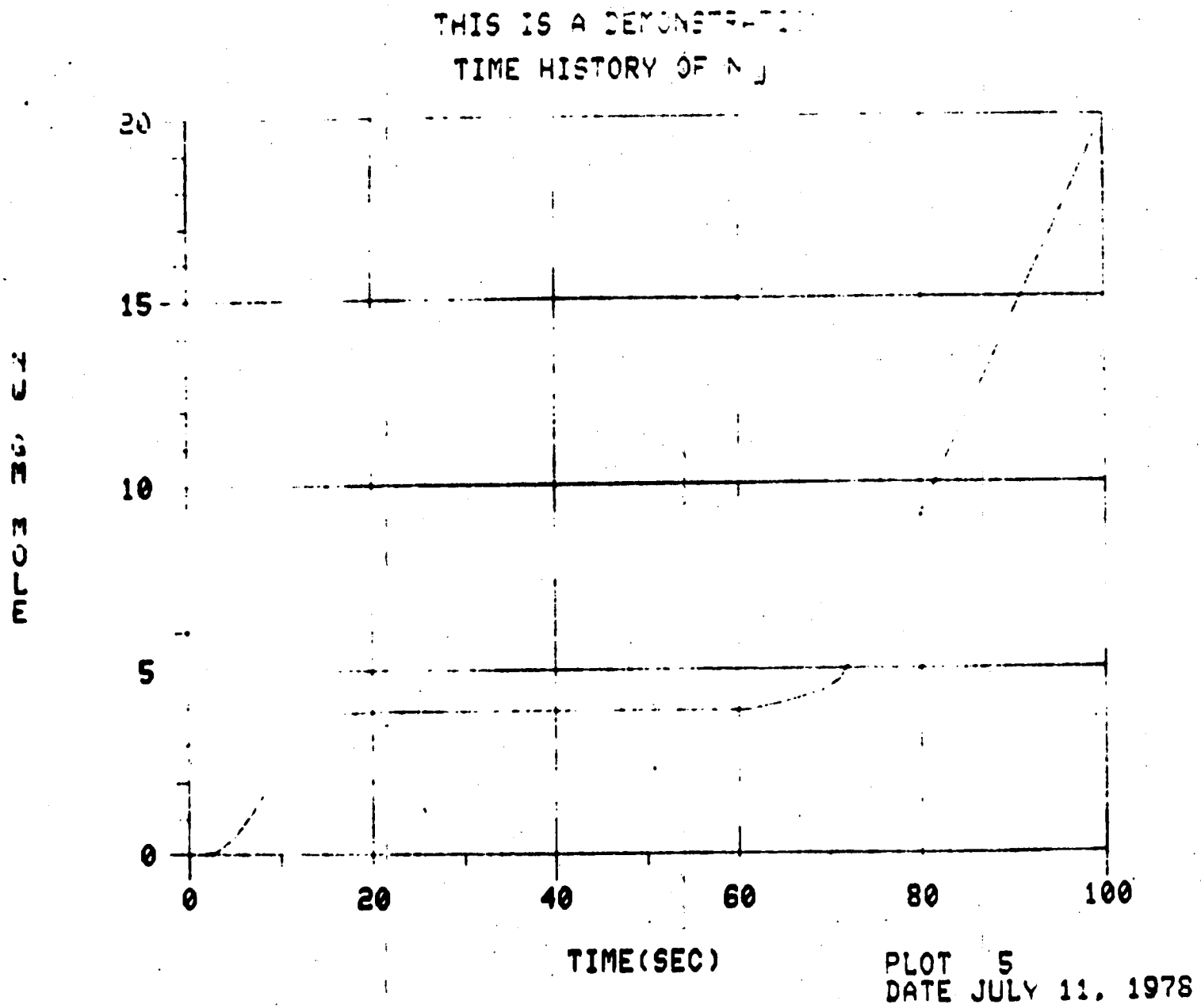

Figure 4-11. Display of Liquid Water Content (gm-mole) vs. Time

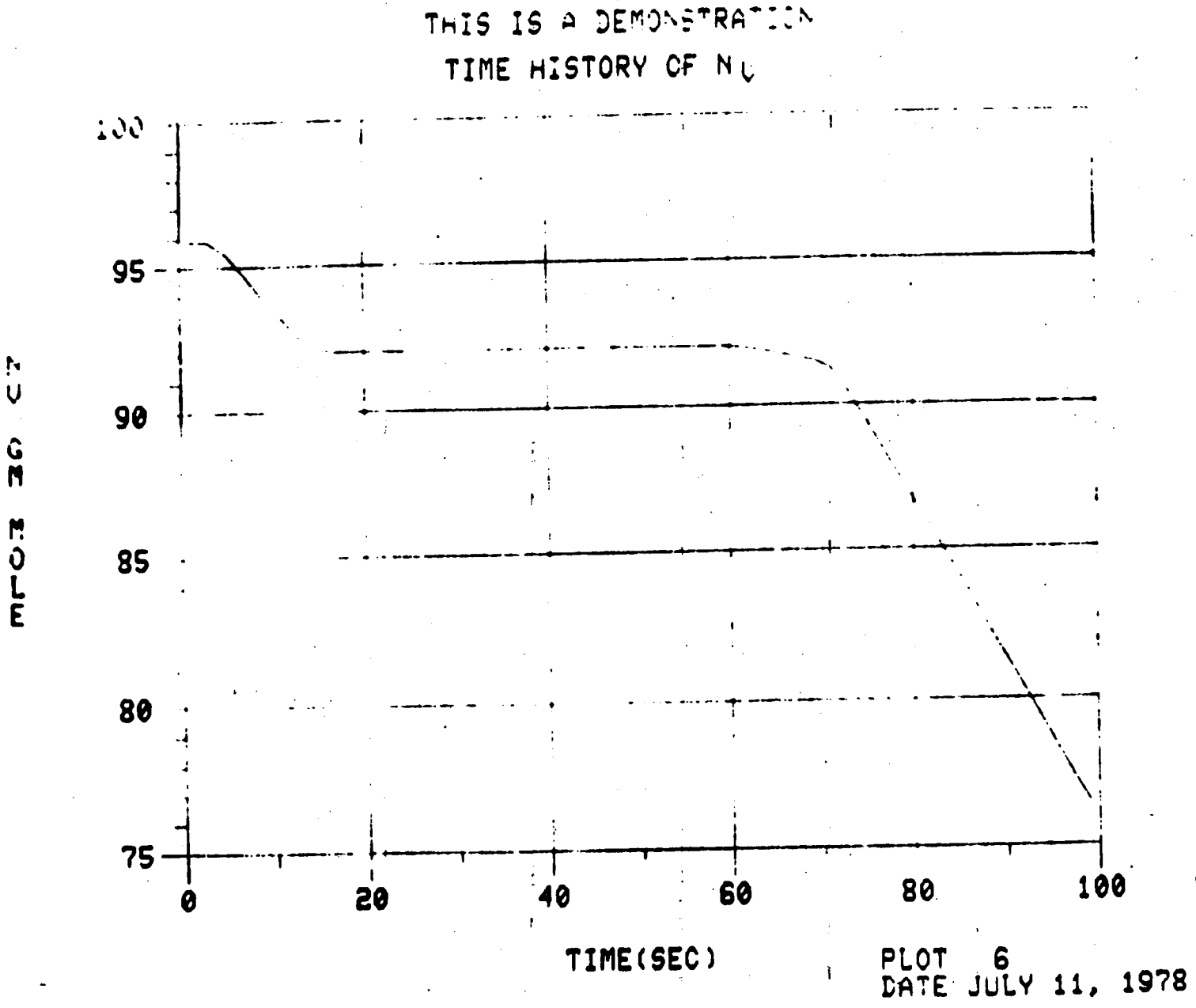

Figure 4-12. Display of Vapor Content (gm-mole) vs. Time

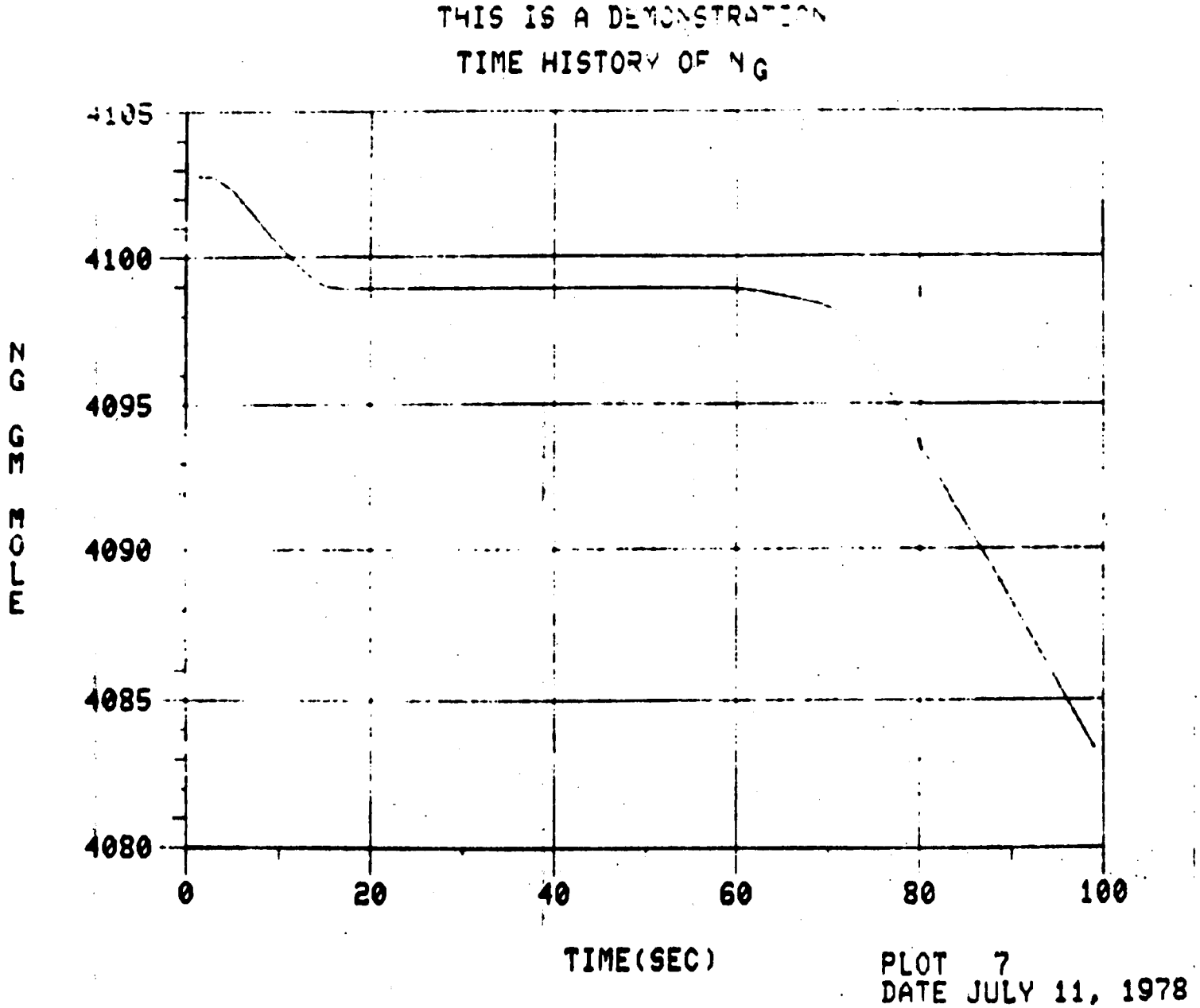

Figure 4-13. Display of Gas Content (gm-mole) vs. Time

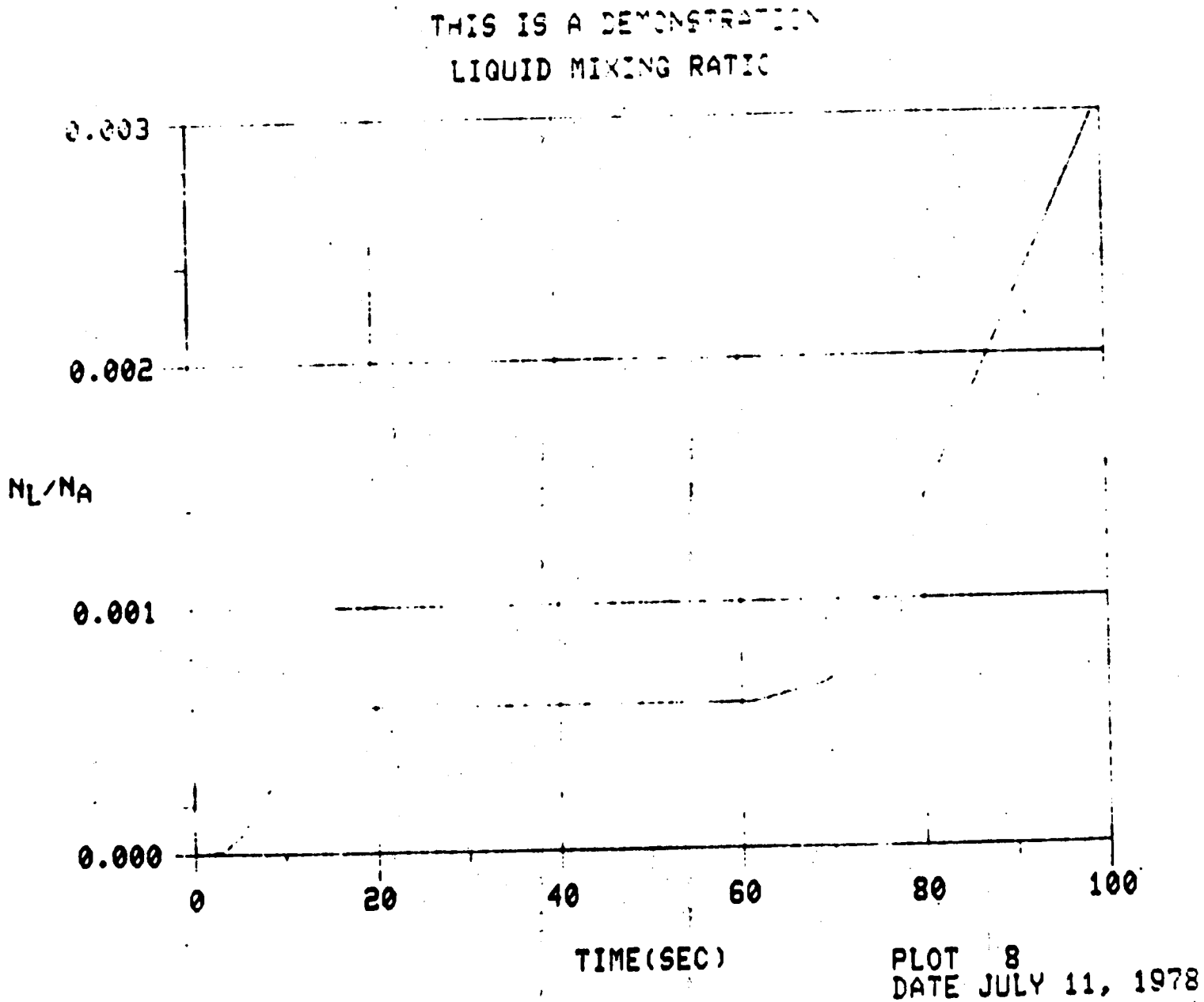

Figure 4-14. Display of Liquid Mixing Ratio vs. Time

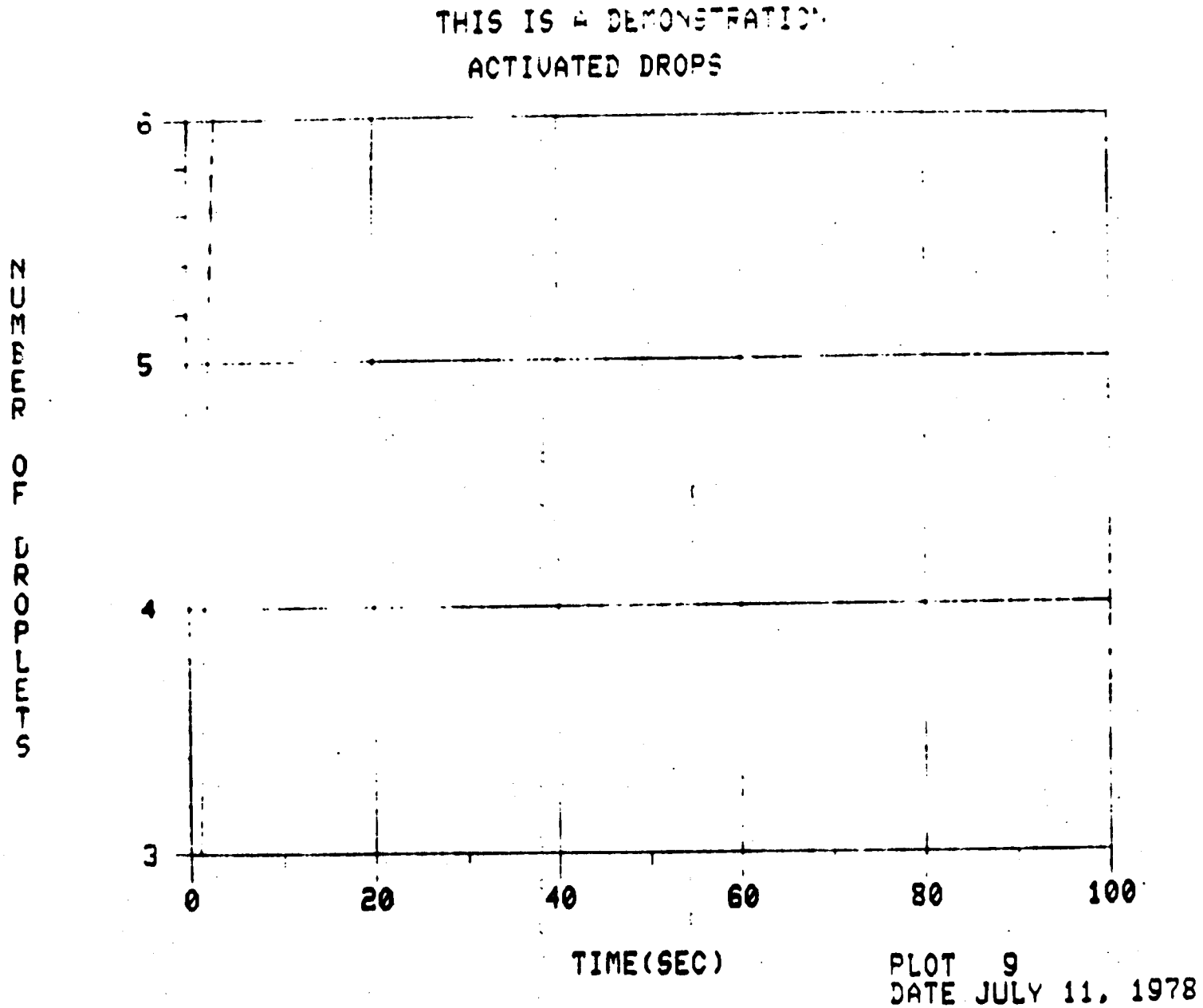

Figure 4-15. Display of Activated Droplet Oasses vs. Time

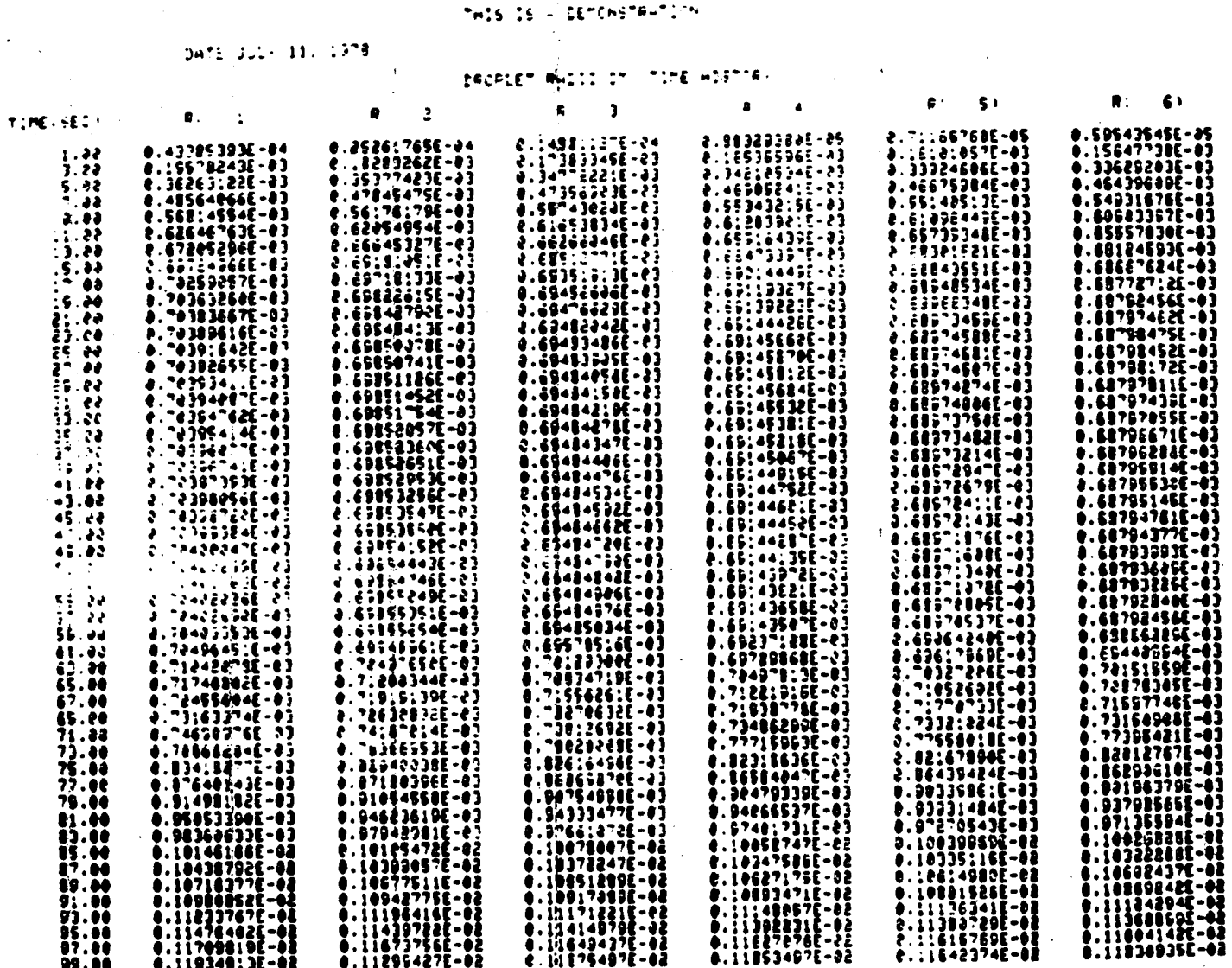

Figure 4-16. Display of Tabulated Output

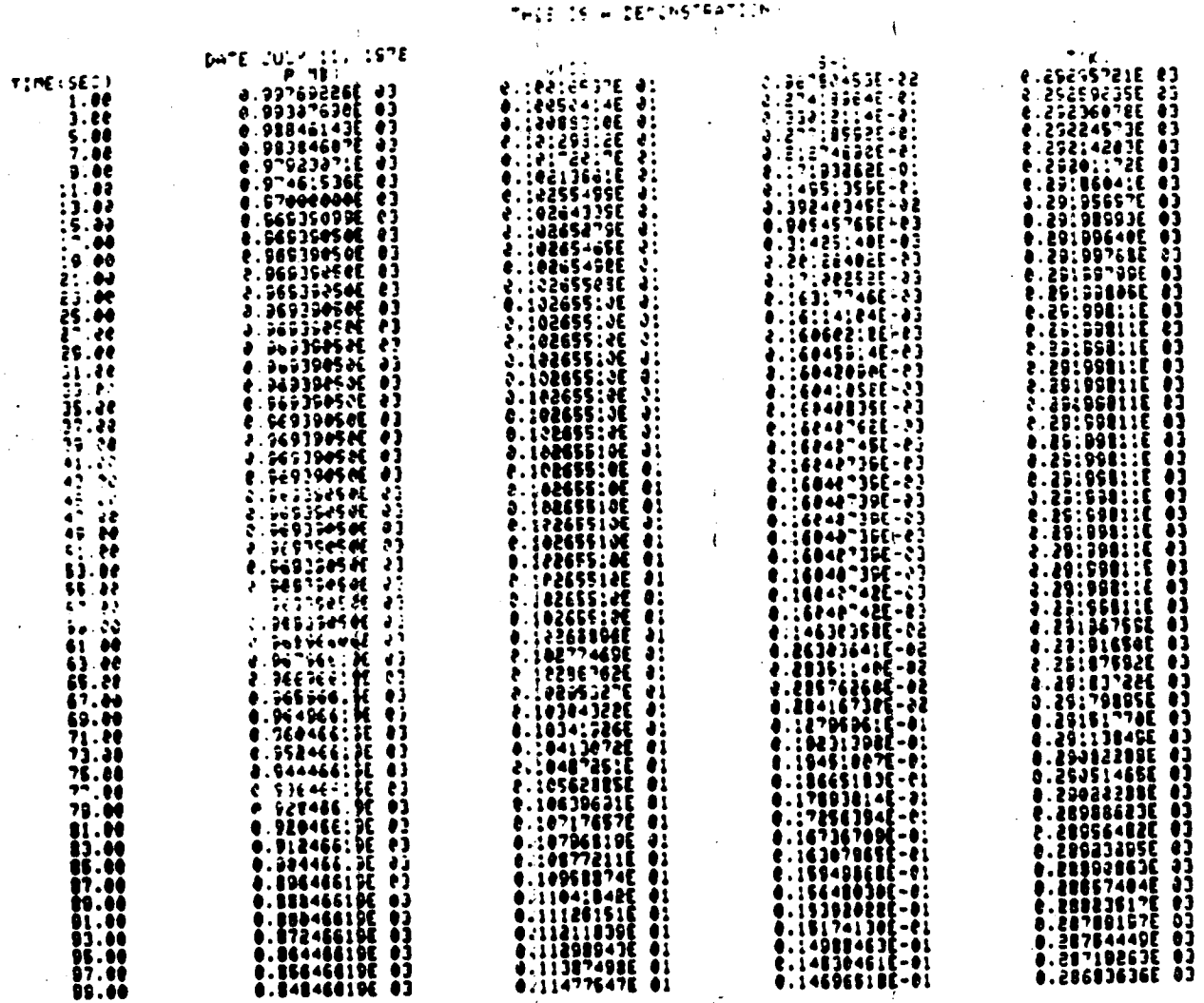

Figure 4-16. Display of Tabulated Output (Cont.)

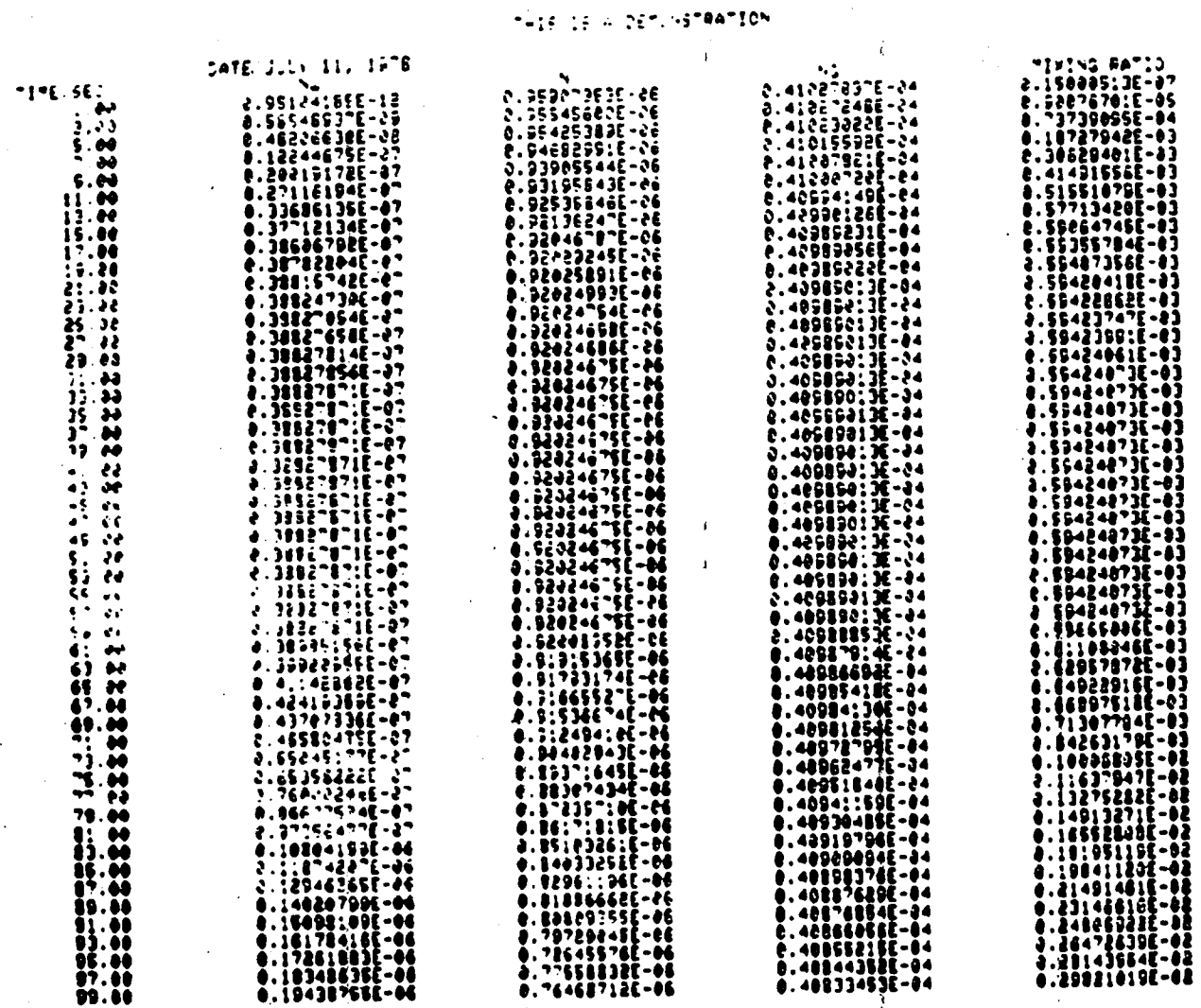

Figure 4-16. Display of Tabulated Output (Cont.)

SECTION 5 - JOB CONTROL LANGUAGE (JCL)

The JCL necessary to run the ACPL Simulation Models from a library on the IBM 360-75 is given in Figure 5-1. In this example, the ACPL program is stored in a user library named ACPL.LOAD.MODULE on disk DS0002. The FORTRAN library is stored in SYS1.FORTLIB.

The JCL consists of three sections:

- Compilation - The driver program is compiled, loaded, and executed with the FORTHCLG card (card 2).

- Linkage edit - Linkage with the programs in the ACPL user library and with the FORTRAN library is achieved with cards 4, 5, and 6 below.

- Execution - Execution is completed with the GO.SYSIN card to input data (card 7).

The delimiter card (card 8) denotes the end of the input data.

The JCL necessary to run the ACPL Simulation Models from a source deck is given in Figure 5-2.

The JCL consists of two sections:

- Compilation - The driver program is compiled, loaded, and executed with the FORTHCLG card (card 1).

- Execution - Execution is completed with the GO.SYSIN card to input data (card 3).

The delimiter card (card 4) denotes the end of the input data.

```
/*SETUP          DS0002
//    EXEC   FORTHCLG, REGION. GO=350K
//FORT. SYSIN   DD   *
```

EXECUTIVE (FORTRAN) MODULE (DRIVER FOR THE ACPL SIMULATION)

```
//LKED. SYSLIB   DD   DSN=ACPL. LOAD. MODULE, UNIT=3330, VOL=SER=DS0002,
//   DISP=SHR
//                  DD   DSN=SYS1. FORTLIB, DISP=SHR
//GO. SYSIN   DD   *
```

INPUT DATA FOR THE ACPL SIMULATION

```
/*
```

Figure 5-1. JCL Run Stream Using ACPL Library

```
//     EXEC   FORTHCLG, REGION. GO=140K
//FORT. SYSIN   DD   *
```

FORTRAN SOURCE DECK

(EXECUTIVE AND EXPERIMENTAL MODULES)

```
//GO. SYSIN   DD   *
```

INPUT DATA FOR THE ACPL SIMULATION

```
/*
```

Figure 5-2. JCL Run Stream Using the Source Deck

SECTION 6 - PROCEDURES FOR MAINTAINING SOFTWARE CONFIGURATION MANAGEMENT AND CONTROL

6.1 INTRODUCTION

This section outlines the procedures required for maintaining the configuration management and control of the software modules as existed in the ACPL Simulation library. Configuration Management for the ACPL system consists of maintaining the libraries for the various simulation modules on the IBM 360/75 computer. There are two steps to maintaining a data set for the ACPL system. These are:

1. Replace the revised subroutine in the data set using ACPLPRC2 proc.
2. Determine the new module identifier and resequence the model using the subroutine RESEQ.

The configuration management module identifier for each model appears in columns 73-80 of the card image and will be changed for each revision to the module.

6.2 Updating ACPL Library Modules

The ACPL Simulation Modules are stored on a series of partitioned data sets on the DSDSØ7 disk on the IBM 360/75 computer. Each module is stored and maintained as a separate data set with each subroutine in the module comprising a member of the set. When a revision is made to one of the ACPL simulation modules, the subroutines to be changed must be replaced in the appropriate data set (library). This is done by executing the ACPLPRC2 proc. ACPLPRC2 replaces the source card images in the appropriate data set and also compiles and link edits each subroutine and places the resulting object module in the data set HODGES.ACPL.LOAD.MOD. Figure 6-1 shows the listing of the card deck for replacing subroutine CANDK in the Adiabatic Expansion Model Library. The first card (SETUP) is a comment to notify the computer operator that the DSDSØ7 disk pack must be available to this job. The second card (EXEC) begins execution of the ACPLPRC2 proc. It also designates the data set and member in which this subroutine will be stored. The next two cards (SAVE and ADD) and the last card (ENDUP) are instructions used by ACPLPRC2. The ADD instruction adds the subroutine if it is a new member, or replaces the member if it exists in the data set.

Appendix C shows a listing of the ACPLPRC2 proc.

6.3 ACPL Module Identifiers

There are basically eight experiment modules in the ACPL Simulation System as developed and completed for Phase I/II tasks. Future development of new models of the ACPL Simulation System will result in the addition of more modules to the existing ACPL simulation library.

Adiabatic Expansion Module
Non-adiabatic Expansion Module
Static Diffusion Liquid (SDL) Module
Continuous Flow Diffusion (CFD) Module
CFD Fluid Dynamics Module
Phoretic Flow CFD Module
Phoretic Flow SDL Module
Two-Dimensional SDL Module

```
// EXEC ACPLPRC2,SLIB='PEDGES.ACPL.AXXX',MBR=CARUK
//SAVE.SYSIN DD *
C/ ADD LIST=ALL,NAME=CARUK
      SUBROUTINE CARUK(AKELVN,SUM)
      IMPLICIT REAL *8(A - H,O - Z)
      COMMON/ARRAYS/SIGPAC(100),SCRIT(100),SSAT(100),NPART(100),
     1              CONC(100),BSCL(100),RAD0(100),RAD(100),RCLT(100),
     2              RCRIT(100),PLTIP(750),PLTR(20,750),
     3              AZERO,ASIGPA,DENSTY,CONCEN,CRCLAS
      REAL*8 NPART
      REAL PLTIP,PLTR
      COMMON/CONSTS/PI,AGAS,MBTAIN,PRTVAP,RMOLEC,CPAIR,CPVAP,CLIC,
     1              GAMMA,TKTEC,CALERG,PATPES,RGVAP,RAPPLT,ENRGIC
      REAL*8 MBTAIN,MRTVAP,RMOLEC
      COMMON/INITL/ TSATCR,PSATUR,TLPPO,PHLSSC,VLLC,AZERO,SSERO,SIGPAC,
     1              TIPLO,TIMEP,DELTAT,TMCLT,COMPSIC)
      REAL*8 AZERO
      COMMON/HOLD/ACLASS,NEGS,NPARTS,ACLP4(4)
C
      TOTAL = CONCEN
      NC1 = NCLASS - 1
      DO 10 I=1,NC1
         J = NCLASS - I + 1
         JI = J - 1
         PARTJ1 = CONCEN*(SIGPAC(JI)*100.)**CRCLAS
         NPART(J) = TOTAL - PARTJ1
         TOTAL = PARTJ1
   10 CONTINUE
      NPART(1) = TOTAL
C
      WRITE (6,145) CONCEN,CRCLAS,ACLASS
  145 FORMAT(' DISTRIBUTION OPTION:   C AND K'/
     1       ' C                              ',D12.4,/,
     2       ' K                              ',D12.4,/,
     3       ' NUMBER OF PARTICLE CLASSES ',I6,//,
     4       '          CLASS      NO. PARTICLES   CRITICAL SIGMA (SUPERS
     5ATURATION)')
  148 FORMAT(12X,I2, 5X,D12.4,12X,D12.4)
      SUM=0.0
      DO 20 I=1,ACLASS
      WRITE (6,148) I,NPART(I),SIGPAC(I)
         BSUL(I)=4.0*AKELVN**3/(27.0*SIGPAC(I)**2)
         RAD(I)=DSQRT(BSUL(I)/AKELVN)
         CALL CUBIC(RAD(I),SIGPAC,AKELVN,BSCL(I))
         RADC(I)=RAD(I)
         SUM=SUM+NPART(I)*RADC(I)**3
         RCRIT(I)=DSQRT(3.0D0)*RAD(I)
         SCRIT(I) = 1.0D 0 + AKELVN/RCRIT(I) - BSCL(I)/RCRIT(I)**2
   20 CONTINUE
      RETURN
      END
C/ ENDUP
```

Figure 6-1. Replace Member In Data Set

In addition to these seven modules there are modules for the executive program and the utility programs.

The following table lists the data sets and subroutines.

Module	Data Set Name	Subroutines
EXECUTIVE	HODGES.ACPL.EXXX	Main Program
ADIABATIC EXPANSION	HODGES.ACPL.AXXX	CANDK COSET DEC DIFFUN DRIVE DRSUB ECINIT ECINPT GAUSS INTERP PEDERV PFUNCT PRINT PSET RADOUT SOL STIFF TLU1 TNT1 USERF USINPT XADIA YTOVAR
NON-ADIABATIC EXPANSION	HODGES.ACPL.NXXX	DIFFEQ NAINIT NAINPT UPDATE VTOYNA XNADIA YTOVNA
STATIC DIFFUSION LIQUID	HODGES.ACPL.SXXX	DIFFSD SDINIT SDINPT UPDASD VTOYSD XCPSDL YTOVSD

Module	Data Set Name	Subroutines
CONTINUOUS FLOW DIFFUSION	HODGES.ACPL.CXXX	CFDGEN CFDOUT CFGRID CFQMAT CFSHFL CINIT CINPUT DEQCFD DNWDT GINIT GINPUT NEWVEL RADOT2 SINJCT SURFT2 TRIDIA XCFD
CFD FLUID DYNAMICS	HODGES.ACPL.FXXX	CNVRG FDGRID FDOUTP FLUID SDEF SPEED STREAM VDEF VORT
UTILITY	HODGES.ACPL.UXXX	ADIFF BEULER CHAP8 COEFF CONST DIFFCO DRCONC DRDIST DTWALL EULER GRID HEATCO HEATL OUTPT PHDNWD PHGRID PHINPT PHRADD PHSURF PHTRID QMAT QUBIC RADOTI SATVPW

Module	Data Set Name	Subroutines
UTILITY (CONT)		SHUFFL
		SURFT
		TCOND
PHORETIC FLOW CFD	HODGES.ACPL.C4XX	CMOVE
		DEQPHC
		PCFDIN
		PCINIT
		PHCGEN
		PHCJCT
		PHCOUT
		PHNWVL
		XPHCFD
PHORETIC FLOW SDL	HODGES.ACPL.S4XX	DEQSDL
		MOVEDR
		PHINIT
		PHUPDT
		SDLVEL
		SDLOUT
		SINIT
		SINPUT
		XSDL
TWO-DIMENSIONAL SDL	HODGES.ACPL.S5SS	DEQS2D
		DNW2D
		GNPT2D
		GRD2D
		INNT2D
		INPT2D
		QMAT2D
		RDOT2D
		SHFL2D
		SOLVEX
		SOLVEZ
		SURF2D
		S2DOUT
		TPROBE
		TRID2D
		UPDT2D
		XSDL2D

The identifier begins in column 73 of the card image. Column 73 has an alphabetic character to denote the module. Column 74 has a numeric character denoting a sub-module. Column 75 is not used at present. Column 76 contains the revision letter with A denoting the first revision. Initially columns 74-76 contain the letter X. Columns 77-80 contain sequence numbers of the card images. The subroutines in each module are stored in alphabetical order and the card images are sequenced as a module. For example, consider a module consisting of Subroutine A, Subroutine B, and Subroutine C with 50, 75, and 100 cards respectively. The first card in Subroutine A would be numbered 1, the first card of Subroutine B would be numbered 51, and the first card of Subroutine C would be numbered 126.

Figure 6-2 illustrates the module identifiers.

6.4 Resequencing ACPL Library Modules

Following the replacement of a subroutine in a data set, resequenced and the new identifier added. The new revision letter is selected to be the next letter in the alphabet after the current revision letter. As noted above, the first revision letter will be A.

Figure 6-3 lists the card deck to resequence the Non-adiabatic Expansion Module. Step 1 executes a program called CSNOTRAN which is a system routine. This program creates a sequential file of card images of the subroutines on the HODGES.ACPL.NXXX data set. Step 2 compiles, loads, and executes the program RESEQ. Input data for this program consists of the following:

Card 1 contains the four-character module identifier in columns 1-4 and the file number for the sequential file created in Step 1 in columns 9-10.

Card 2 and following are the JCL cards required for replacing the subroutines in the data set. Note that four cards (EXEC, SAVE, ADD, and ENDUP) are required for each subroutine, that the four-card sets are in alphabetical order by subroutine, and that ALL subroutines, in the data set are required.

MODULE IDENTIFIER

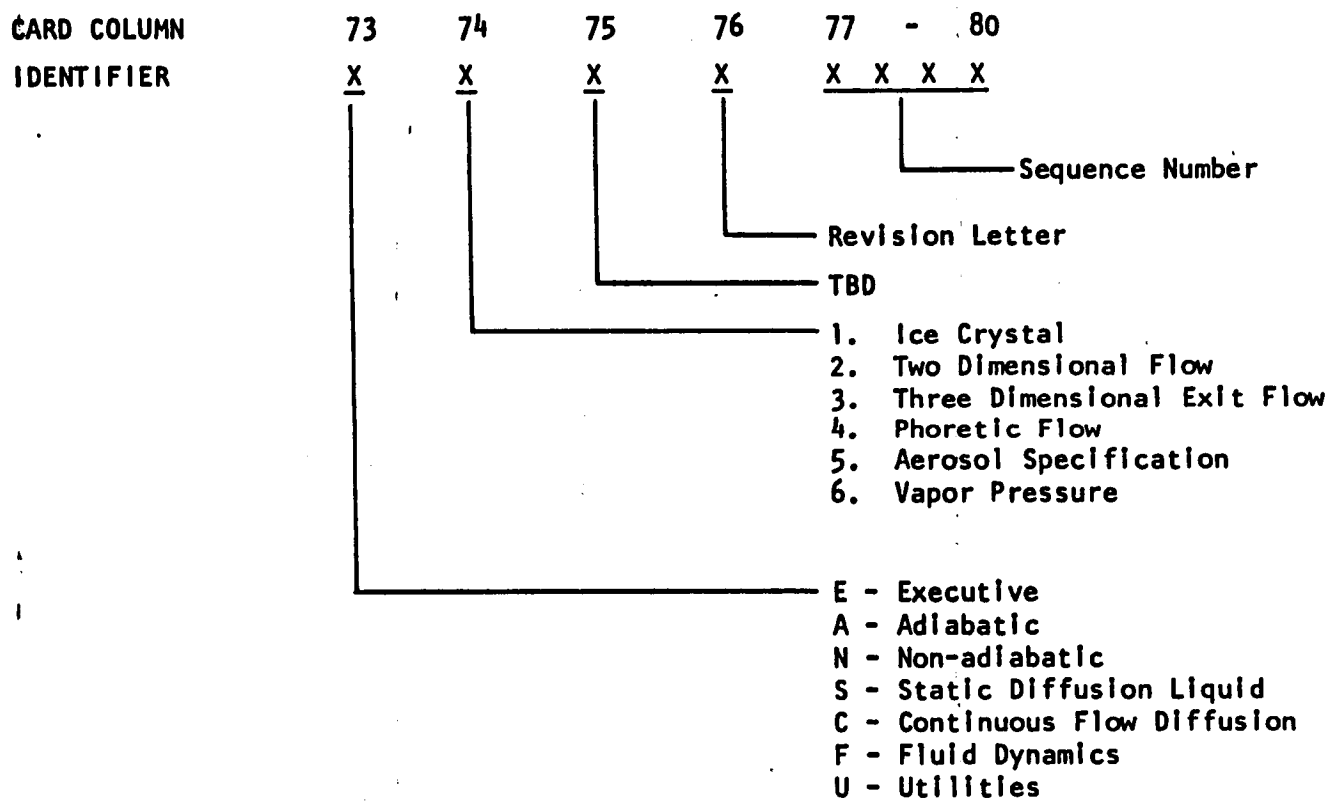

Figure 6-2. ACPL Module Identifiers

```
// ACCT,S,ZUY,IHFAB14,0Z63,HHODGES,MSGLEVEL=(1,1)
/*SETUP       DSDS07,NASTRN
// EXEC PGM=CSHGTRAN
//STEPLIB  DD  UNIT=3330,VOL=SER=NASTRN,DISP=SHR,DSN=NSLIB
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=BCC
//PDSIN  DD  UNIT=3330,VOL=SER=DSCS07,DSN=HODGES.ACPL.NXXX,DISP=SHR
//SECOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=&&JNXXX,
//      DCB=(BLKSIZE=3200,SPACE=(3200,(1000,100))
//SYSIN  DD  DUMMY,DCB=BLKSIZE=80
//STEP2  EXEC  FORTHCLG
//FORT.SYSIN  DD  *
C     THIS PROGRAM UPDATES AND RESEQUENCES MEMBERS OF A LIBRARY
C        THEY REPLACES THE MEMBERS IN THE LIBRARY
C
C     THE MEMBERS OF THE LIBRARY ARE ON DISK FILE, UNIT NUMBER IS
C     READ FROM FIRST INPUT CARD
C
C     THE JCL STATEMENTS FOLLOW AS CARD INPUT
C
C     THE OUTPUT FILE ON UNIT 20 WILL BE EXECUTED TO REPLACE THE MEMBERS
C        IN THE LIBRARY UPON RECEIVING THE EOF STATEMENT
C
C
      INTEGER*2 JCL1(40)
      DIMENSION IN(20),EOF(20),JCL2(20),JCL3(20)
      DIMENSION END(10),IEND(10)
      REAL*8 END,IEND
       EQUIVALENCE (IEND(1),IN(1))
C     CONFM IS THE CONFIGURATION MANAGEMENT CONTROL
      DATA EOF/'/*EO','F   ',18*'  '/
      DATA JCL1/'//','D ',3*'  ',' J','LB',' (',',  ',31*'  '/
      DATA JCL2/'// A',',06,5',',2C)',',1HF',',A614',',0263',',8HOD',
     1          'GLS,',',MSGL',',EVEL',',(1,',',1)  ',8*'  '/
      DATA JCL3/'/*SE',',TUP ',',    ',',   D',',SDS0',',7   ',14*'  '/
      DATA END/'      EN',',D   ',8*'  '/
      N=0
      IFILE=20
      READ(5,200) ICONFM,JFILE
      REWIND JFILE
   10 CONTINUE
C     SET UP FIRST JOB CONTROL CARD, CALL SEQGOS TO ASSIGN JOB NUMBER
      CALL SEQGOS(JCL1(2))
      WRITE(IFILE,103) JCL1
      WRITE(6,104) JCL1
C     WRITE NEXT TWO JOB CONTROL STATEMENTS
      WRITE(IFILE,100) JCL2
      WRITE(6,104) JCL2
      WRITE(IFILE,100) JCL3
      WRITE(6,104) JCL3
      DO 60 J=1,10
C     WRITE EXEC, SAVE, AND ADD JCB CONTROL STATEMENTS
      DO 30 I=1,3
         READ(5,100,END=800) IN
         WRITE(IFILE,100) IN
      WRITE(6,104) IN
   30 CONTINUE
   40 CONTINUE
      READ(JFILE,100,END=900) IN
```

Figure 6-3. Card Deck List to Resequence the Non-Adiabatic Expansion Module

```
      N=N+1
      IA(19)=ICONFM
      IA(20)=N
      WRITE(3,104) IA
      WRITE(IFILE,105) IA
      IF(IEND(1).EQ.END(1) .AND. IEND(2).EQ.END(2)) GO TO 50
      GO TO 40
   50 CONTINUE
C     WRITE ENDUP JCL CONTROL STATEMENT
      READ(5,103,END=800) IA
      WRITE(IFILE,100) IA
      WRITE(3,104) IA
   60 CONTINUE
      WRITE(IFILE,100) ECF
      WRITE(6,104) EOF
      GO TO 10
  800 CONTINUE
      WRITE(IFILE,100) ECF
      WRITE(6,104) EOF
      WRITE(3,101)
      STOP
  900 CONTINUE
      WRITE(6,102)
      STOP
  100 FORMAT(20A4)
  101 FORMAT('0END OF JCL CARDS')
  102 FORMAT('0ERROR - - ECF ON DISK FILE')
  103 FORMAT(80A1)
  104 FORMAT(1X,19A4,I4)
  105 FORMAT(19A4,I4)
  200 FORMAT(A4,I6)
      END
//GO.SYSIN  DD  DATA
XXXX    14
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=DIFFEQ
//SAVE.SYSIN  DD  *
./  ADD     NAME=DIFFEQ
./  ENDUP
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=MAINIT
//SAVE.SYSIN  DD  *
./  ADD     NAME=MAINIT
./  ENDUP
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=MAINPT
//SAVE.SYSIN  DD  *
./  ADD     NAME=MAINPT
./  ENDUP
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=UPDATE
//SAVE.SYSIN  DD  *
./  ADD     NAME=UPDATE
./  ENDUP
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=VTOVNA
//SAVE.SYSIN  DD  *
./  ADD     NAME=VTOVNA
./  ENDUP
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=XNADIA
//SAVE.SYSIN  DD  *
./  ADD     NAME=XNADIA
./  ENDUP
//  EXEC  ACPLPRC2,SLIB='HODGES.ACPL.NXXX',MBR=VTOVNA

//SAVE.SYSIN  DD  *
./  ADD     NAME=VTOVNA
./  ENDUP
/*
//SEQGEN   DD  DSN=SYS1.SEQGEN,DISP=OLD
//FT16F001  DD  UNIT=3330,DSN=&&JNXXX,DISP=(OLD,DELETE)
//FT20F001 DD  UNIT=INTRDR,DCB=(RECFM=F,LRECL=80,BLKSIZE=80),DISP=OLD
/*
```

Figure 6-3. Card Deck List to Resequence the Non-Adiabatic Expansion Module (Cont.)

The final card of the input data must be followed by the delimiter card with /* in the first two columns. DD cards describing the necessary files follow the delimiter.

RESEQ reads the input data cards and the sequential card image file of subroutines, appends the configuration management module identifier, sequences the cards, and writes the information to the internal card reader (file 20), merging the JCL cards with the subroutines in such a way as to duplicate a data set update card deck. At the end an EOF is written to file 20, causing the job set up on file 20 to be executed.

6.5 Creating a Tape

Magnetic tape is the medium used to supply a copy of any or all of the modules to an investigator or scientist. The requested modules are transferred from the disk to tape using IBM system routines and a FORTRAN program.

The following table lists the models and libraries as well as modules required for each model.

MODEL	MODULES REQUIRED	LIBRARY
ADIABATIC	EXEC	HODGES.ACPL.EXXX
	ADIABATIC	HODGES.ACPL.AXXX
	UTILITIES	HODGES.ACPL.UXXX
NON-ADIABATIC	EXEC	HODGES.ACPL.EXXX
	NON-ADIABATIC	HODGES.ACPL.NXXX
	UTILITIES	HODGES.ACPL.UXXX
SDL	EXEC	HODGES.ACPL.EXXX
	SDL	HODGES.ACPL.SXXX
	UTILITIES	HODGES.ACPL.UXXX
CFD	EXEC	HODGES.ACPL.EXXX
	CFD	HODGES.ACPL.CXXX
	UTILITIES	HODGES.ACPL.UXXX
FLUID	EXEC	HODGES.ACPL.EXXX
	FLUID	HODGES.ACPL.FXXX

MODEL	MODULES REQUIRED	LIBRARY
PHORETIC FLOW CFD	EXEC	HODGES.ACPL.EXXX
	PHORETIC CFD	HODGES.ACPL.C4XX
	UTILITIES	HODGES.ACPL.UXXX
PHORETIC FLOW SDL	EXEC	HODGES.ACPL.EXXX
	PHORETIC SDL	HODGES.ACPL.S4XX
	UTILITIES	HODGES.ACPL.UXXX
TWO-DIMENSIONAL SDL	EXEC	HODGES.ACPL.EXXX
	TWO-DIMENSIONAL SDL	HODGES.ACPL.S5XX
	UTILITIES	HODGES.ACPL.UXXX

6.6 Creating a New Library

When a new model is added to the ACPL Simulation, a new library must be created on DSDS07 to contain the subroutines belonging to the new model. This is done by using the system routine IERBR14 to allocate disk space for the new data set and then using ACPLPRC2 to add the subroutines to the data set.

Figure 6-4 shows the cards necessary to allocate space for HODGES.ACPL.C4XX and HODGES.ACPL.S4XX. Refer to figure 6.1 and section 6.2 above for a description of ACPLPRC2.

```
/*SETUP        DSDS07
//  EXEC   PGM=IEFBR14
//DUM1  DD  DSN=HODGES.ACPL.S4SS,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VOL=SER=DSDS07,SPACE=(TRK,(10,5,10))
//DUM2  DD  DSN=HODGES.ACPL.C4XX,UNIT=3300,DISP=(NES,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VOL=SER=DSDS07,SPACE=(TRK,(10,5,10))
```

Figure 6-4. Card Deck List to Create New Library

Appendix D lists the card deck to transfer all the ACPL simulation models from disk to tape.

Appendix E lists the JCL to execute the ACPL simulation from tape.

Appendix F lists a card deck to execute the ACPL simulation from the load module on the HODGES.ACPL.LOAD.MOD data set.

Appendix G lists a program to compress the ACPL data sets.

Appendix H describes the ACPL Simulation System created in Phase I of this program. This is the version provided to the investigators prior to 12/1/79.

APPENDIX A

LABELLED COMMON USED BY ALL EXPERIMENT MODULES

The following common areas are used to evaluate the constants required in the calculations of parameters and to provide coefficients in determining various attributes of the system.

A.1 CONSTS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
PI	R*8	0	3. 1415926535898
RGAS	R*8	8	UNIVERSAL GAS CONSTANT
MWTAIR	R*8	16	MOLECULAR WEIGHT OF DRY AIR
MWTVAP	R*8	24	MOLECULAR WEIGHT OF WATER
RHOLIQ	R*8	32	DENSITY OF LIQUID WATER
CPAIR	R*8	40	MOLAR HEAT CAPACITY OF DRY AIR
CPVAP	R*8	48	MOLAR HEAT CAPACITY OF WATER VAPOR
CLIQ	R*8	56	MOLAR HEAT CAPACITY OF LIQUID WATER
GAMMA	R*8	64	SPECIFIC HEAT RATIO
TKTOC	R*8	72	TEMPERATURE OF FREEZING POINT OF WATER (DEG K)
CALERG	R*8	80	CALORIES/ERG
PATMOS	R*8	88	ATMOSPHERIC PRESSURE
RGVAP	R*8	96	RGAS/MWTVAP
NWFACT	R*8	104	4*PI*RHOLIQ/MWTVAP
ERATIO	R*8	112	MWTVAP/MWTAIR

A.2 COEFFS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
A1	R*8	0	A1 - A7 ARE COEFFICIENTS USED FOR
A2	R*8	8	CALCULATING THE SATURATION VAPOR
A3	R*8	16	PRESSURE
A4	R*8	24	
A5	R*8	32	
A6	R*8	40	
A7	R*8	48	

A.2 COEFFS COMMON AREA (Cont.)

NAME	TYPE	DISPLACEMENT	DESCRIPTION
B1	R*8	56	B1 AND B2 ARE COEFFICIENTS USED FOR
B2	R*8	64	CALCULATING THE LATENT HEAT OF CONDENSATION
D1	R*8	72	D1 - D3 ARE COEFFICIENTS USED FOR
D2	R*8	80	CALCULATING THE DIFFUSION
D3	R*8	88	COEFFICIENT
E1	R*8	96	E1 - E3 ARE COEFFICIENTS USED FOR
E2	R*8	104	CALCULATING THE THERMAL DIFFUSION
E3	R*8	112	COEFFICIENT

APPENDIX B

LABELLED COMMON AREAS FOR DIFFERENT EXPERIMENT MODULES

The common areas used by the various experiment modules use the same names, but the configuration and parameters vary according to the module.

B.1 LABELLED COMMON AREAS USED BY THE ADIABATIC EXPANSION MODULE

B.1.1 VARBLE COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
TIME	R*8	0	TIME IN SECONDS
P	R*8	8	PRESSURE
T	R*8	16	TEMPERATURE
V	R*8	24	VOLUME
S	R*8	32	SUPERSATURATION
PDOT	R*8	40	PRESSURE DERIVATIVE
TDOT	R*8	48	TEMPERATURE DERIVATIVE
VDOT	R*8	56	VOLUME DERIVATIVE
SDOT	R*8	64	SUPERSATURATION DERIVATIVE
NAIR	R*8	72	NUMBER OF MOLES OF AIR
NVAPOR	R*8	80	NUMBER OF MOLES OF WATER
NLIQ	R*8	88	NUMBER OF MOLES OF LIQUID WATER
NGAS	R*8	96	NUMBER OF MOLES OF WATER VAPOR PLUS AIR
NVDOT	R*8	104	RATE OF CHANGE OF VAPOR IN GRAM-MOLES
NWDOT	R*8	112	RATE OF CHANGE OF LIQUID WATER IN GRAM-MOLES
NGDOT	R*8	120	RATE OF CHANGE OF GAS IN GRAM-MOLES
XAIR	R*8	128	FRACTION OF PRESSURE DUE TO AIR
XVAPOR	R*8	136	FRACTION OF PRESSURE DUE TO WATER VAPOR
PVAPOR	R*8	144	PARTIAL PRESSURE OF WATER VAPOR
PAIR	R*8	152	PARTIAL PRESSURE OF AIR

B.1.2 ARRAYS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
SIGMAC	R*8	0	CRITICAL SUPERSATURATION
SCRIT	R*8	800	CRITICAL SATURATION RATIO
SSAT	R*8	1600	SUPERSATURATION
NPART	R*8	2400	NUMBER OF PARTICLES PER UNIT VOLUME
CONC	R*8	3200	NUMBER OF ACTIVATED PARTICLES PER CC
BSOL	R*8	4000	SOLUTION COEFFICIENT USED IN KOHLER EQUATION
RADØ	R*8	4800	INITIAL RADIUS OF AEROSOL PARTICLE
RAD	R*8	5600	RADIUS OF AEROSOL PARTICLE
RDOT	R*8	6400	DERIVATIVE OF RADIUS
RCRIT	R*8	7200	CRITICAL RADIUS OF AEROSOL PARTICLE

B.1.3 INITL COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
TSATUR	R*8	0	SATURATOR TEMPERATURE
PSATUR	R*8	8	SATURATOR PRESSURE
TEMPØ	R*8	16	INITIAL CHAMBER TEMPERATURE
PRESSØ	R*8	24	INITIAL CHAMBER PRESSURE
VOLØ	R*8	32	REFERENCE VOLUME
NZERO	R*8	40	NUMBER OF MOLES OF WATER VAPOR
SZERO	R*8	48	INITIAL SATURATION RATIO
SIGMAØ	R*8	56	INITIAL SUPERSATURATION
TIMEØ	R*8	64	TIME AT BEGINNING OF EXPERIMENT
TIMEF	R*8	72	TIME AT END OF EXPERIMENT
DELTAT	R*8	80	INTEGRATION TIME INCREMENT
TMOUT	R*8	88	OUTPUT TIME INCREMENT

B.1.4 FACTRS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
LAFACT	R*8	0	TEMPORARY FACTOR FOR CALCULATING LALPHA
LBFACT	R*8	8	TEMPORARY FACTOR FOR CALCULATING LBETA
LCFACT	R*8	16	TEMPORARY FACTOR FOR CALCULATING SDOT
LRFACT	R*8	24	TEMPORARY FACTOR FOR CALCULATING SDOT, PDOT, TDOT

B.1.5 PARAMS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
ALPHA	R*8	0	THERMAL ACCOMMODATION COEFFICIENT
BETA	R*8	8	CONDENSATION COEFFICIENT
SURFT	R*8	16	SURFACE TENSION OF WATER
HTCOND	R*8	24	THERMAL CONDUCTIVITY OF AIR
LHTVAP	R*8	32	LATENT HEAT OF VAPORATION
D	R*8	40	DIFFUSION COEFFICIENT
TSQRT	R*8	48	SQUARE ROOT OF TEMPERATURE
CPBAR	R*8	56	TEMPORARY FACTOR FOR CALCULATING PDOT, TDOT
LALPHA	R*8	64	COEFFICIENT DERIVED FOR COMPUTING DROPLET SIZE
LBETA	R*8	72	COEFFICIENT DERIVED FOR COMPUTING DROPLET SIZE
LAMBDA	R*8	80	COEFFICIENT DERIVED FOR COMPUTING DROPLET SIZE
CA	R*8	88	COEFFICIENT DERIVED FOR COMPUTING DROPLET SIZE
CB	R*8	96	COEFFICIENT DERIVED FOR COMPUTING DROPLET SIZE

B.1.6 INDEX COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
NCLASS	I*4	0	NUMBER OF CLASSES OF AEROSOL PARTICLES
NEQS	I*4	4	NUMBER OF DIFFERENTIAL EQUATIONS

B.1.7 COMPUT COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
Y	R*8	0	ARRAY OF VARIABLES
DY	R*8	1024	ARRAY OF DERIVATIVES

B.1.8 DRVAR COMMON AREA

DRVAR common area is used to store values for driving force options.

NAME	TYPE	DISPLACEMENT	DESCRIPTION
PRESUR	R*8	0	PRESSURE
DRPRES	R*8	160	DP/DT
UPDRFT	R*8	320	UPDRAFT
TMPTR	R*8	480	TEMPERATURE
TIMEPT	R*8	640	TIME
TEMPDR	R*8	800	RATE OF CHANGE OF FUNCTION
NOPT	I*4	960	OPTION INDEX
NPNTS	I*4	964	NUMBER OF POINTS

B.2 LABELLED COMMON AREAS USED BY THE NON-ADIABATIC EXPANSION MODULE AND THE STATIC DIFFUSION LIQUID EXPERIMENT MODULE

B.2.1 VARBLE COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
TIME	R*8	0	TIME IN SECONDS
T	R*8	8	TEMPERATURE
VOLUME	R*8	176	VOLUME
VNEW	R*8	344	NEW VOLUME OF GRID ELEMENT
S	R*8	512	SUPERSATURATION
NAIR	R*8	680	NUMBER OF MOLES OF AIR
NVAPOR	R*8	848	NUMBER OF MOLES OF WATER VAPOR
NGAS	R*8	1016	NUMBER OF MOLES OF WATER VAPOR PLUS AIR
NLIQ	R*8	1184	NUMBER OF MOLES OF LIQUID WATER
AREA	R*8	1352	AREA OF GRID ELEMENT
Z	R*8	1520	GRID LENGTH
PDOT	R*8	1688	PRESSURE DERIVATIVE
TDOT	R*8	1696	TEMPERATURE DERIVATIVE
SDOT	R*8	1864	SUPERSATURATION DERIVATIVE
NADOT	R*8	2032	RATE OF CHANGE OF DRY AIR IN GRAM-MOLES
NVDOT	R*8	2200	RATE OF CHANGE OF VAPOR IN GRAM-MOLES
NGDOT	R*8	2368	RATE OF CHANGE OF GAS IN GRAM-MOLES
NWDOT	R*8	2536	RATE OF CHANGE OF LIQUID WATER IN GRAM-MOLES

B.2.1 VARBLE COMMON AREA (Cont.)

NAME	TYPE	DISPLACEMENT	DESCRIPTION
VDOT	R*8	2704	VOLUME DERIVATIVE
VTOTAL	R*8	2871	TOTAL VOLUME
NTOTAL	R*8	2880	TOTAL NUMBER OF MOLES OF GAS PLUS LIQUID
SIGMA	R*8	3048	SUPERSATURATION
P	R*8	3216	PRESSURE

B.2.2 ARRAYS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
RAD	R*8	0	RADIUS OF AEROSOL PARTICLES
NPART	R*8	16800	NUMBER OF PARTICLES
CONC	R*8	33600	NUMBER OF ACTIVATED PARTICLES PER CC
RDOT	R*8	50400	RADIUS DERIVATIVE
RZERO	R*8	67200	INITIAL RADIUS
RCRIT	R*8	68000	CRITICAL RADIUS OF AEROSOL PARTICLE
SIGMAC	R*8	68800	CRITICAL SUPERSATURATION
BSOL	R*8	69600	SOLUTION COEFFICIENT USED IN KOHLER EQUATION
NZERO	R*8	70400	INITIAL NUMBER OF PARTICLES
CDROP	R*8	71200	DROPLET CONCENTRATION

B.2.3 INITL COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
PSATUR	R*8	0	SATURATOR PRESSURE
TSATUR	R*8	8	SATURATOR TEMPERATURE
PZERO	R*8	16	INITIAL CHAMBER PRESSURE
TZERO	R*8	24	INITIAL CHAMBER TEMPERATURE
DPDT	R*8	32	DERIVATIVE OF PRESSURE
VZERO	R*8	40	REFERENCE VOLUME
DZ	R*8	48	DERIVATIVE OF DISTANCE
DZINV	R*8	56	INVERSE OF DZ/2
TMZERO	R*8	64	TIME AT BEGINNING OF EXPERIMENT

B.2.3 INITL COMMON AREA (Cont.)

NAME	TYPE	DISPLACEMENT	DESCRIPTION
TIMEF	R*8	72	TIME AT END OF EXPANSION
TMOUT	R*8	80	OUTPUT TIME INCREMENT
TIMEND	R*8	88	TIME AT END OF EXPERIMENT
DELTAT	R*8	96	INTEGRATION TIME INCREMENT
TMRAMP	R*8	104	DURATION OF PLATE TEMPERATURE RAMP
DTW1	R*8	112	TOP PLATE TEMPERATURE RAMP RATE
DTW2	R*8	120	BOTTOM PLATE TEMPERATURE RAMP RATE
TW1	R*8	128	TEMPERATURE OF TOP PLATE
TW2	R*8	136	TEMPERATURE OF BOTTOM PLATE

B.2.4 INDEX COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
NSPACE	I*4	0	NUMBER OF GRID POINTS
NI	I*4	4	BEGINNING INDEX OF GRID POINTS
NF	I*4	8	NSPACE - 1
NEQS	I*4	12	NUMBER OF DIFFERENTIAL EQUATIONS
NCLASS	I*4	16	NUMBER OF CLASSES OF AEROSOL PARTICLES
KGEOM	I*4	20	GEOMETRY INDICATOR FOR COORDINATE SYSTEM
LGEOM	I*4	24	KGEOM + 1

B.2.5 COMPUT COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
Y	R*8	0	ARRAY OF VARIABLES
DY	R*8	1024	ARRAY OF DERIVATIVES
AMAT	R*8	2048	MATRIX OF EQUATION COEFFICIENTS
BMAT	R*8	5576	ARRAY OF EQUATION ANSWERS
Q	R*8	5744	TOTAL MASS

B.2.6 PARAMS COMMON AREA

NAME	TYPE	DISPLACEMENT	DESCRIPTION
ALPHA	R*8	0	THERMAL ACCOMMODATION COEFFICIENT
BETA	R*8	8	CONDENSATION COEFFICIENT
LAFACT	R*8	16	TEMPORARY FACTOR FOR CALCULATING LALPHA
LBFACT	R*8	24	TEMPORARY FACTOR FOR CALCULATING LBETA

Appendix C ACPLPRC2 Proc

```
/*SETUP       DSCSC7
//  EXEC   PGM=IEFBR14
//DUM1  DD  DSN=HCDGES.ACPL.EXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VOL=SER=DSCSC7,SPACE=(TRK,(5,1,2))
//DUM2  DD  DSN=HCDGES.ACPL.AXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VOL=SER=DSCSC7,SPACE=(TRK,(10,5,10))
//DUM3  DD  DSN=HCDGES.ACPL.BXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VOL=SER=DSDSC7,SPACE=(TRK,(10,5,10))
//DUM4  DD  DSN=HCDGES.ACPL.SXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VCL=SER=DSDSC7,SPACE=(TRK,(10,5,10))
//DUM5  DD  DSN=HCDGES.ACPL.CXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VCL=SER=DSDSC7,SPACE=(TRK,(20,5,10))
//DUM6  DD  DSN=HCDGES.ACPL.FXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VCL=SER=DSDSC7,SPACE=(TRK,(20,5,10))
//DUM9  DD  DSN=HCDGES.ACPL.GXXX,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=FB,BLKSIZE=6400,LRECL=80),
//          VCL=SER=DSDSC7,SPACE=(TRK,(10,5,10))
//DUMC  DD  DSN=HCDGES.ACPL.LCAD.MCC,UNIT=3330,DISP=(NEW,KEEP),
//          DCB=(RECFM=U,BLKSIZE=13030),
//          VCL=SER=DSCSC7,SPACE=(TRK,(100,20,50))
//   EXEC  PGM=IEBCPDTE,PARM=NEW
//SYSPRINT DD  SYSOUT=A
//SYSUT1  DD  DSN=DSDS.CATPROC,DISP=SHR,
//   VOL=SER=CSC001,UNIT=3330
//SYSUT2  DD  DSN=DSDS.CATPROC,DISP=SHR,
//   VOL=SER=CSCC01,UNIT=3330
//SYSIN   DD  DATA
./  ADD   LIST=ALL,NAME=ACPLPRC2
//ACPLPRC2  PROC  SCIE='ACPL.PXXX',MBR='TEST'
//SAVE  EXEC  PGM=IEBUPDTE,PARM=NEW
//SYSPRINT  DD  SYSOUT=A
//SYSUT1  DD  DSN=&SLIB,DISP=(OLD,PASS),
//       VOL=SER=DSDSC7,UNIT=3330
//SYSUT2  DD  DSN=&SLIB,DISP=(OLD,PASS),
//       VOL=SER=DSDSC7,UNIT=3330
//FORT  EXEC  PGM=IEKAA00,REGION=256K,COND=(0,LT,SAVE),PARM='CPT=0'
//SYSPRINT  DD  SYSOUT=A
//SYSPUNCH  DD  SYSOUT=B
//SYSLIN  DD  DSN=&LOADSET,UNIT=SYSSC,DISP=(MOD,PASS),
//     SPACE=(400,(200,50),RLSE)
//SYSIN DD DSN=&SLIB(&MBR),UNIT=3330,DISP=(OLD,KEEP),
//   VOL=SER=CSCSC7
//LKED  EXEC  PGM=IEWL,REGION=256K,
//  PARM='(MAP,LET,LIST,NCAL,SIZE=(262144,32768))',
//   COND=((10,LT,SAVE),(4,LT,FORT))
//SYSLIB   DD  DSN=SYS1.FORTLIB,DISP=SHR
//SYSPRINT  DD  SYSOUT=A
//SYSLMOD   DD  DSN=HCDGES.ACPL.LCAD.MCC(EPBR),
//   UNIT=3330,
//   VOL=SER=DSDSC7,SPACE=,DISP=(OLD,KEEP)
//SYSUT1   DD  DSN=&SYSUT1,UNIT=SYSDA,SPACE=(CYL,(12,6))
//             DCB=BLKSIZE=13C30
//SYSLIN   DD  DSN=&LOADSET,DISP=(OLD,PASS)
//
//   DD  DDNAME=SYSIN
//DELETE  EXEC  PGM=IEFBR14
//SYSLIN DD DSN=&LOADSET,DISP=(OLD,DELETE)
./  ENDUP
/*
```


New page

Appendix D. Card Deck List to Transfer all the ACPL Simulation to Tape

```
// A06,5,201,DHFA614C2838HUDGES,MSGLEVEL=(1,1)
/*SETUP        DSDSC7
//JOBLIB DD UNIT=3330,VOL=SER=DSDSC7,DISP=SHR,DSN=NSLIB
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.EXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJEXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.DXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJDXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNCTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=800
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.AXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJAXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=800
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.NXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJNXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.SXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJSXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.CXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJCXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.FXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJFXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.GXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJGXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
//POSIN   DD  UNIT=3330,VOL=SER=DSDSC7,DSN=HUDGES.ACPL.SXXX,DISP=SHR
//SEQOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=CCJSXXX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100C,100))
//SYSIN   DD  DUMMY,DCB=BLKSIZE=80
// EXEC PGM=CSNUTRAN
//SYSPRINT  DD  SYSOUT=A,DCB=BLKSIZE=300
```

Appendix D. Card Deck to Transfer all the ACPL Simulation to Tape (Cont.)

```
//POSIN  DD  UNIT=3330,VOL=SER=USU307,DSN=HUDGES.ACPL.SSXX,DISP=SHR
//SEJOUT  DD  UNIT=3330,DISP=(NEW,PASS),DSN=&&JSSAX,
//       DCB=BLKSIZE=3200,SPACE=(3200,(100,100))
//SYSIN  DD  DUMMY,DCB=BLKSIZE=80
// EXEC FORTHCLG,REGION.FORT=200K,REGION.GO=68K
C      THIS PROGRAM READS THE SEQUENTIAL FILES CREATED BY CSALTRAN,
C      BEGINNING WITH THE EXEC PROGRAM, AND WRITES THEM TO TAPE
C
       DIMENSION IN(20)
       IFILE=11
       DO 30 J=1,10
   10     READ(IFILE,100,END=20) IN
          WRITE( 9,100) IN
          WRITE(6,101) IN
          GO TO 10
   20     IFILE=IFILE+1
          WRITE(6,102)
C
   30  CONTINUE
       END FILE  9
       STOP
C
  100  FORMAT(19A4,I4)
  101  FORMAT(1X,19A4,I4)
  102  FORMAT('1')
C
       END
//GO.FT09F001 DD  UNIT=TAPE9,LABEL=(1,BLP),VOL=SER=ACPL2
//FT11F001  DD  UNIT=3330,DSN=&&JEXXX,DISP=(CLD,DELETE)
//FT12F001  DD  UNIT=3330,DSN=&&JGXXX,DISP=(OLD,DELETE)
//FT13F001  DD  UNIT=3330,DSN=&&JAXXX,DISP=(OLD,DELETE)
//FT14F001  DD  UNIT=3330,DSN=&&JNXXX,DISP=(OLD,DELETE)
//FT15F001  DD  UNIT=3330,DSN=&&JBXXX,DISP=(OLD,DELETE)
//FT16F001  DD  UNIT=3330,DSN=&&JCXXX,DISP=(OLD,DELETE)
//FT17F001  DD  UNIT=3330,DSN=&&JFXXX,DISP=(OLD,DELETE)
//FT18F001  DD  UNIT=3330,DSN=&&JL4XX,DISP=(OLD,DELETE)
//FT19F001  DD  UNIT=3330,DSN=&&JS4XX,DISP=(OLD,DELETE)
//FT20F001  DD  UNIT=3330,DSN=&&JS5XX,DISP=(OLD,DELETE)
/*
```

Appendix E JCL List to Execute the ACPL Simulation from Tape

```
// 406,20,201,1MFAw140263dMJDUEs, (SGLEVEL=(1,1)
//    EXEC  F33IM:LG,PARM.LKED='OVLY,MAP,LET,LIST,SIZE=(262144,327681',
//          REGION.LKED=300K,REGION.GO=400K
//FORT.SYSLIN DD SPACE=(CYL,(30,5))
//FORT.SYSIN  DD  DSN=CINPUT,UNIT=TAPE9,LABEL=(1,BLP),
//    DISP=(OLD,DELETE),VOL=SER=ACPL2,
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=80,DEN=2)
//LKED.SYSIN  DD  *
        ENTRY MAIN
        INSERT MAIN,COEFF,CONST,JJBIC,DIFFCO,HEATL,SATVPd,HEATCJ
        OVERLAY A
        INSERT DRIVL,SIIFE,DIFFUN,PEUNCT
        INSERT YTOVAR,RADOUT,JACOB,CUSET
        INSERT PSET,DEC,INTERP,SOL,PLOTRV
        INSERT XADIA,ECINPT,ECINIT,USINPT,GAUSS
        INSERT TLOL,THTI,USERF,CANDK
        OVERLAY A
        INSERT ADIFF,DTMAT,SJKET,TFUND,GRID
        INSERT RADOTI,EULER,BEULLR,JMAT,SHUFFL,OUTPT,CHAPB
        OVERLAY B
        INSERT XNADIA
        INSERT MAINPT,MAINIT
        INSERT DIFFEQ,UPDATE,YTOVNa,VTOYNA
        OVERLAY B
        INSERT XCPSOL
        INSERT SOLNPT,SOLNIT
        INSERT DIFFSO,JPOASO,YTOVSO,VTOYSO
        OVERLAY B
        INSERT GINPUT,GINIT,CFGRID,XCFD,CINPJT
        INSERT CINIT,DEJCFD,NEWYEL,SINJCT,CFDOUT
        INSERT DNmDT,CFJMAT,CFSHFL,TNIDIA,SURFT2
        INSERT CFJGEN,RADOT2
        OVERLAY A
        INSERT CNVRG,FDGRID,FDINPT,FLJID,FDOUTP,LUCEL,SDEF
        INSERT SPEED,STREAM,VDEF,VJAT
//GO.SYSIN  DD  *
ADIA EXP
    1000.          300.15          1.
    1000.          299.75
       0.             50.              .005          1.0
       1.            .03          75.
CANDK
    10   1000.          1.0
      .001
      .002
      .003
      .004
      .005
      .006
      .007
      .008
      .009
      .010
    DPDT    1
      -0.67        50.
ADIA EXP
      1000.          293.15          1.
      1000.          293.15
         0.             50.              .005          1.0
```

Appendix E JCL List to Execute the ACPL Simulation from Tape (Cont.)

```
        1.                  .03          75.
USER
     6
       25.                  .002
      100.                  .004
      125.                  .006
      125.                  .008
      100.                  .009
       25.                  .01
 PYSTIMF    >
     1000.                  0.
      880.                  13.
      880.                  66.
      840.                  70.
      500.                  100.
NADI EXP
    11    2     1.82
 291.45    1023.
 293.15    1023.
     1    1.
  200.        .05
    0.        600.        10.
    1.        .03
    2
DPJT        -1.21         25.
DPJT         0.0          600.
SDL EXP
    1.          .03
 293.15    1000.          0.
     6    1.
  25.           .002
 100.           .004
 125.           .006
 125.           .008
 100.           .009
  25.           .01
    11    0     .2
    0.          3.        100.          5.
   50.          .04        -.04
CFD EXP
    1.          .03
CES TO 6
    20
 500.           1.          .002        .01
  66.           2.          36.         12.
   3.           6.          15.
 293.15    1000.          295.15      291.15
        30 291.15    1000.          50.
         3 293.15     291.15
    .3625   11.
CFD EXP
    1.          .03
 N VS SC
     6
  25.           .002
 100.           .004
 125.           .006
 125.           .008
 100.           .009
```

Appendix E JCL List to Execute the ACPL Simulation from Tape (Cont.)

```
  25.          .01
  66.          2.          36.          12.
   3.          6.          15.
293.15    1000.          295.15       291.15
          30 291.15    1000.          50.
           3 293.15    291.15
    .0625     3.
CFD EXP
   1.          .03
COS TO K
   20
500.           1.          .002         .01
  66.          2.          36.          12.
   3.          6.          15.
293.15    1000.          295.15       291.15
          30 291.15    1000.          50.
           3 293.15    291.15
    .0625     3.
FLUID
   0.14        VISCK    F10.3   FLUID VISCOSITY
  72.0         CFLJRT   F10.3   CARRIER FLOW RATE                (CM**3)/SEC
   2.0         AFLJRT   F10.3   AEROSOL FLOW RATE                (CM**3)/SEC
   2.0         HEIGHT   F10.3   FULL CHAMBER HEIGHT                        CM
  36.0         WIDTH    F10.3   FULL CHAMBER WIDTH                        CM
  15.0         DIST     TOTAL CHAMBER LENGTH(W/ EXIT PORT)                 CM
 7.400E-03     HUPEN    E10.3   FULL THROAT HEIGHT                        CM
  12.0         TWIDTH   F10.3   FULL THROAT WIDTH
   0.62        THROAT   F10.3   THROAT LENGTH                             CM
   0.531       A        F10.3   ELLIPSE AXIS(PERPENDICULAR TO FLOW)       CM
   1.591       B        F10.3   ELLIPSE AXIS(PARALLEL TO FLOW)            CM
   5.0         DUMNST   F10.3   LOCATION OF CENTER OF ELLIPSE             CM
   2.0         XLEN     F10.3   LENGTH OF EXIT PORT                       CM
   0.4         XHGT     F10.3   FULL HEIGHT OF EXIT PORT                  CM
  36.0         XWIDTH   F10.3   FULL WIDTH OF EXIT PORT                    CM
     1         ITMIN    I5      MINIMUM NUMBER OF ITERATIONS
   600         ITMAX    I5      MAXIMUM NUMBER OF ITERATIONS
1.000E-02      CONCRT   E10.3   CONVERGENCE CRITERION
  1.00         RELAX    F10.3   RELAXATION COEFFICIENT
    21         NY       I5      NUMBER OF POINTS IN LARGE Y GRID
    31         NS       I5      NUMBER OF POINTS IN SMALL Y (S) GRID
   101         NZ       I5      NUMBER OF POINTS IN Z GRID
     4         NTMIN    I5      MINIMUM NUMBER OF GRID POINTS IN THROAT
STOP SIM
/*
```

New page

Appendix F Card Deck List to Execute the ACPL Simulation from the Load Module on the HODGES.ACPL.LOAD.MOD Data Set

```
// ACC,20,20),IRFAE14C2E38HODGES,PSGLEVEL=(1,1)
//    EXEC  FORTHCLG,PARM.LKED='CVLY,MAP,LET,LIST,SIZE=(262144,32768)',
//          REGION.LKED=3CCK,REGION.GO=3CCK
//FORT.SYSIN  DD  *
C     *****          *****          *****          *****
C                EXECUTIVE MODULE OF THE ACPL SIMULATOR
C     *****          *****          *****          *****
      IMPLICIT REAL *8(A - H,C - Z)
C
      COMMCN/CCNSTS/PI,RGAS,PRTAIR,PRTVAP,RHCLIC,CPAIR,CPVAP,CLIC,
     1              GAMMA,TKTCC,CALERG,PATMOS,RGVAP,RAFACT,ERATIC
      COMMCN/COEFFS/A1,A2,A3,A4,A5,A6,A7,B1,B2,C1,L2,E3,E1,E2,E3
      REAL*8 PRTAIR,PRTVAP,RAFACT,MBRACC
      DIMENSICN EXAPE(8)
C
C
C DEFINE TPE EXPERIMENT NAMES
C
      DATA EXPNME/'ALIA EXP','RADI EXP','SCL EXP ','VPRS SCL','CFD EXP ',
     1           'FLLIC   ','XXXXXXXX','XXXXXXXX'/
     *,ENDSIP/'STOP SIP'/
C
C
C
C CALL COEFF3 SUBROUTINE TC DEFINE VALUES CF COEFFICIENTS TC BE USED FOR
C THERMODYNAMIC CALCULATICN
C
      CALL CCEFF
C
C CALL CCNSTN SUBROUTINE TC DEFINE VALUES CF CONSTANTS
      CALL CCNST
C
C READ IN EXPERIMENT NAME TO BE SIMULATED
    1 READ(5,5)  EXPNME
    5 FORMAT(2A8)
      IF(EXPAPE .NE. ENDSIM) GC TC 11
      WRITE(6,6)
    6 FORMAT(1H ,3X,'* END SIMULATION *')
      GO TO 555
   11 DO 20 I = 1,8
      IF(EXPAPE .EC. EXPNME(I)) GC TC 3C
   20 CONTINUE
C
      WRITE(6,12)
   12 FORMAT(1H ,10X,'  * * ERROR ENCOUNTERED IN EXPERIMENT NAME * *')
      STOP
C
C
   30 CONTINUE
      GC TO (1CC,2CC,3CC,4CC,5CC,6CC,7CC,8CC), I
C
  100 NSPACE = 1
      CALL  XACIA
      GO TO 1
C
  200 NSPACE = 10
      CALL  XRADIA
      GO TO 1
C
```

Appendix F Card Deck List to Execute the ACPL Simulation from the Load Module on the HODGES.ACPL.LOAD.MOD Data Set (Cont.)

```
  300 NSPACE = IC
      CALL  XCPSOL
      GO TO 1
C
  400 NSPACE = ID
C     CALL  XVPSOL
      GO TO 1
C
  500 NSPACE = IC
      CALL GINPLT
      CALL  XCFD
      GO TO 1
C
  600 NSPACE = 1
      CALL FLGID
      GO TO 1
C
  700 CONTINUE
      GO TO 1
C
  800 CONTINUE
      GO TO 1
C
C
  999 STOP
      END
//LKED.SYSLIB  DD  DSN=HODGES.ACPL.LOAD.MOD,UNIT=3330,VOL=SER=CSUSC7,
//  DISP=SHR
//             DD  DSN=SYS1.FLNILIB,DISP=SHR
//             DD  DSN=SYS1.PSFCLIB,DISP=SHR
//LKED.SYSIN  DD  *
       ENTRY MAIN
       INSERT MAIN,CUEFF,CCASI,CUBIC,DIFFCC,PEAIL,SAIDPR,PEFICC
       OVERLAY A
       INSERT CRIVE,SIIFF,DIFFCR,PFCNCT
       INSERT VICVAR,RADDCT,DRSUB,CCSET
       INSERT PSET,CEC,INTERP,SOL,PEDERV
       INSERT XACIA,ECIAPI,ECIAIT,CSIAPT,GAUSS
       INSERT ILCI,INII,CSERP,CANDR
       OVERLAY A
       INSERT ACIFF,DIBALL,SCRFT,ICCAD,GRID
       INSERT RADOTI,EULER,BEULER,CMAT,SHUFFL,CCTPT,CHAPB
       OVERLAY B
       INSERT XNACIA
       INSERT NAINPT,NAINIT
       INSERT DIFFEC,LPCAIE,VICVNA,VICVAA
       OVERLAY B
       INSERT XCPSOL
       INSERT SOINPT,SOINIT
       INSERT DIFFSO,UPDASO,VICVSO,VICYSO
       OVERLAY B
       INSERT GINPLT,GINIT,CFGRID,XCFC,CIAPUT
       INSERT CINIT,DEUCFD,NEEVEC,SINJCT,CFDGDT
       INSERT DNADI,CFOPAT,CFSHFL,TRIDIA,SURFT2
       INSERT CFDGEN,RADCT2
       OVERLAY A
       INSERT CNVRG,FLGRID,FCINPT,FLUID,FCCCTP,ICCCCC,SCEP
       INSERT SPEED,STREAM,VDEF,VCRT
//GO.SYSIN  DD  *
```


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Appendix F Card Deck List to Execute the ACPL Simulation from the Load Module on the HODGES.ACPL.LOAD.MOD Data Set (Cont.)

```
ACIA EXP
      1000.          300.15          1.
      1000.          293.15
         0.             5C.                .005          1.0
         1.             .C3               75.
GAUSSIAN
     21 .0000C122     .CCCCC0244          2.16
      4.7619
      4.7619
      4.7619
```

Appendix F Card Deck List to Execute the ACPL Simulation from the Load Module on the HODGES.ACPL.LOAD.MOD Data Set (Cont.)

```
      125.          .CC8
      100.          .CC5
       25.          .C1
   DPGI    4
     -2.3           13.
        0.          6C.
       -.5          7C.
     -4.0           1CC.
ALIA EXP
     1000.         253.15          1.
     1CC0.         253.15
        0.          5C.            .005          1.0
        1.          .C3            75.
USER
    6
       25.          .C02
      1CC.          .C04
      125.          .C06
      125.          .CC8
      100.          .CC5
       25.          .C1
 IVSTIME    6
      288.0         0.C
      28C.0         20.C
      280.0         3C.C
      276.C         7C.C
      274.C         1CC.C
ALIA EXP
     1000.         253.15          1.
     1CCC.         253.15
        0.          5C.            .005          1.C
        1.          .C3            75.
USER
    6
       25.          .C02
      100.          .CC4
      125.          .CC6
      125.          .0C8
      100.          .CC5
       25.          .C1
  UPDRFI    4
       50.          1C.
      100.          4C.
       75.          6C.
      150.          1CC.
ALIA EXP
     1000.         253.15          1.
     1000.         253.15
        0.          1CC.           .005          1.0
        1.          .C3            75.
USER
    6
       25.          .C02
      100.          .CC4
      125.          .CC6
      125.          .CC8
      100.          .CC5
       25.          .C1

  PFUNCT
STOP SIM
```


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Appendix G Program List to Compress the ACPL Data Sets

```
//*SETUP        CSESC7
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.EXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.AXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.NXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.SXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.CXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.FXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.GXXX,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
//COMPRESS EXEC  PGM=IEBCOPY
//PDSNAME DD DSN=HOLGES.ACPL.LLAD.MLD,DISP=(OLD,KEEP),UNIT=SYSCA,
//  VOL=SER=OSDSC7
//SYSPRINT DD    SYSOUT=A
//SYSUT3   DD    DSNAME=&TEMP1,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSUT4   DD    DSNAME=&TEMP2,UNIT=SYSSC,SPACE=(TRK,(1))
//SYSIN    DD    *
        COPY  OUTDD=PDSNAME,INDD=PDSNAME
```

APPENDIX H

PHASE 1 ACPL SOFTWARE MODULES

The Phase 1 version of the ACPL simulation software modules are stored in the data set ACPL.SOURCE on disk DSØØØ2 of the IBM 360/75 computer. This version includes the Adiabatic, Non-adiabatic, Static Diffusion Liquid, and Continuous Flow Diffusion Modules, including all utility programs and the Gear integration programs. The executive module is not included in ACPL.SOURCE. The subroutines of ACPL.SOURCE have been compiled and link edited and the object module stored on ACPL.LOAD.MOD on the DSØØØ2 disk.

The Adiabatic Expansion Module on DSØØØ2 does not include the distribution option.

The Non-adiabatic Expansion Module on DSØØØ2 allows only one expansion of the gas parcel.

The SDL and CFD Modules on DSØØØ2 are the same as those stored on DSDSØ7.

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